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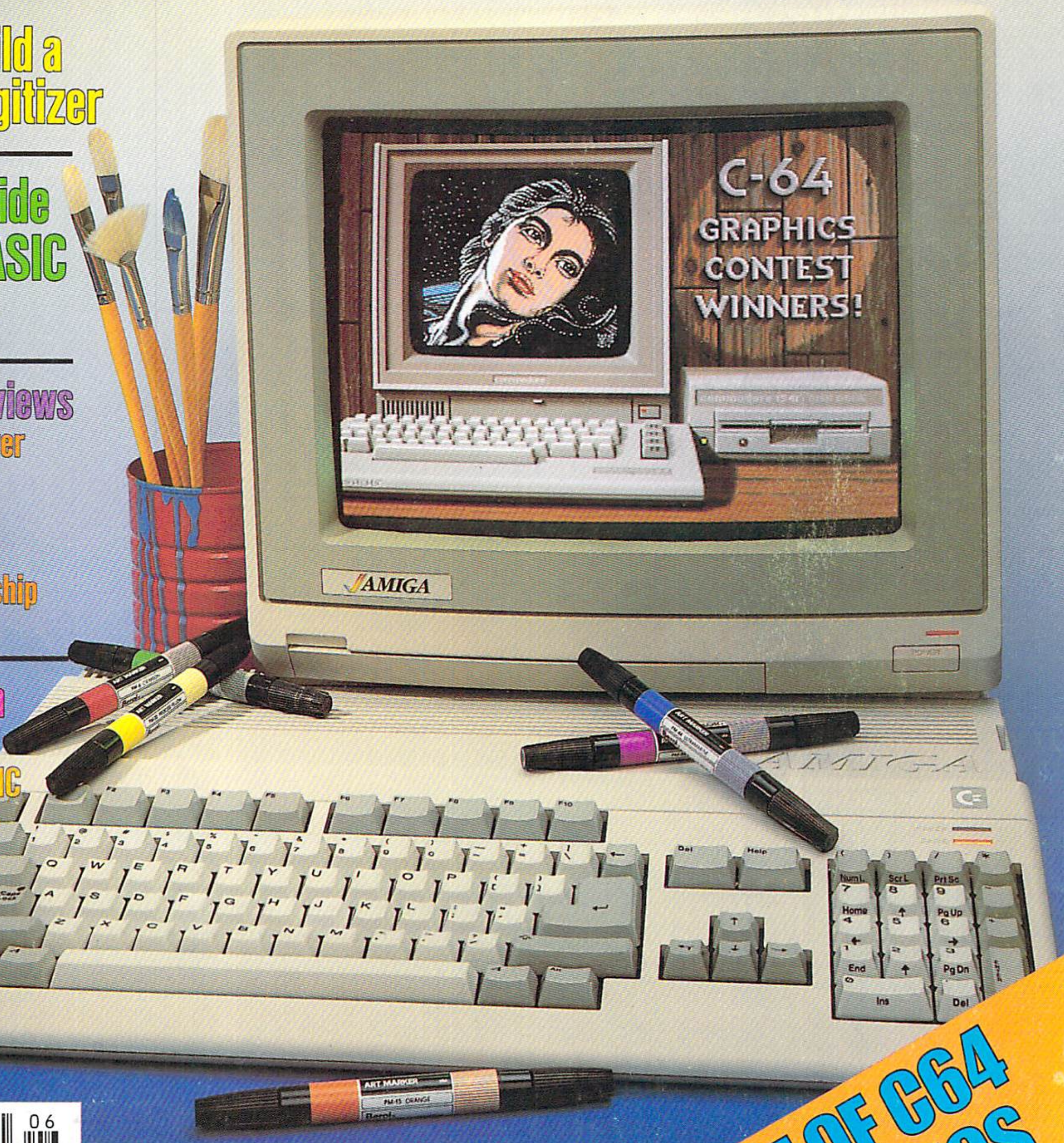
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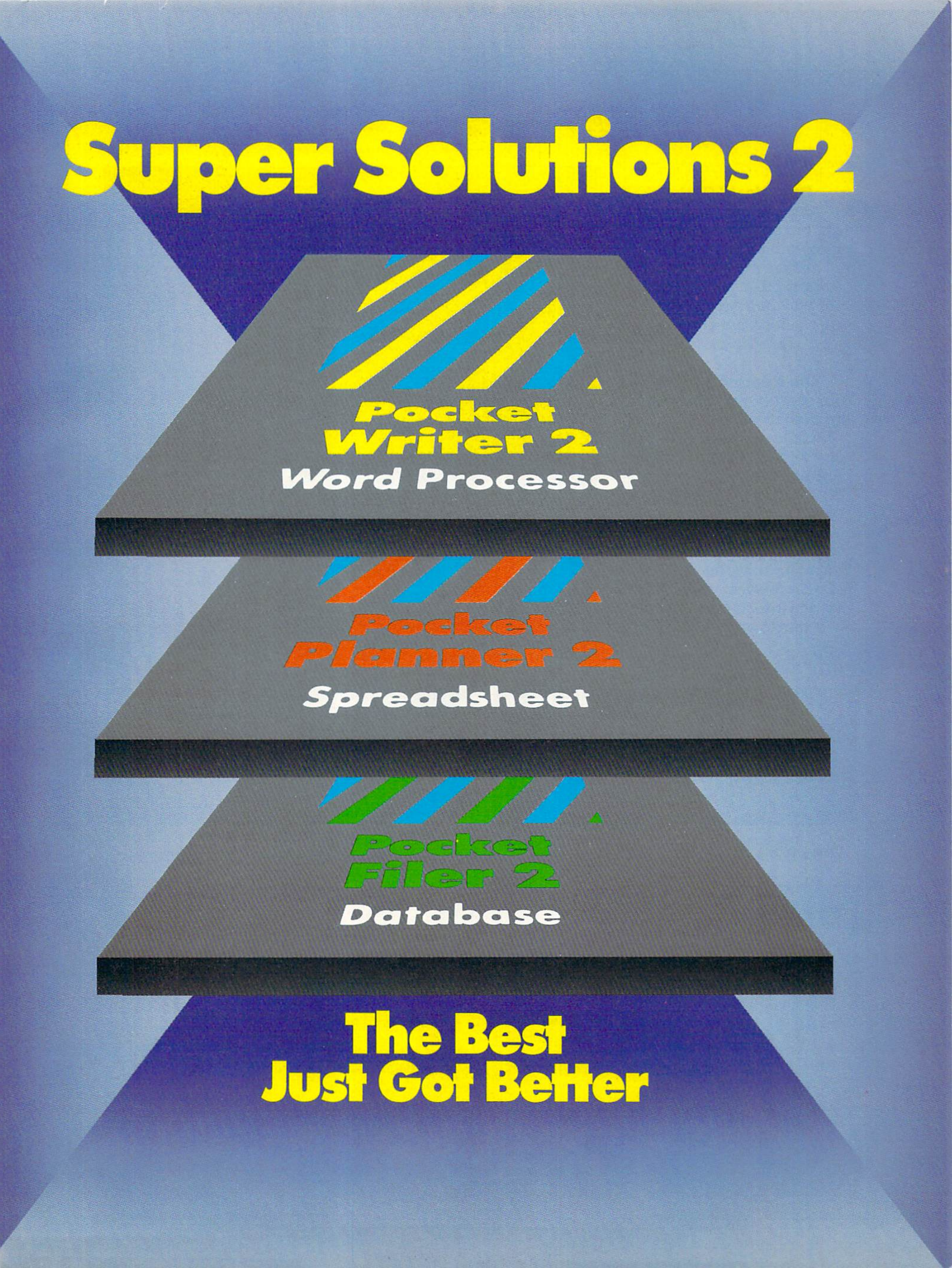
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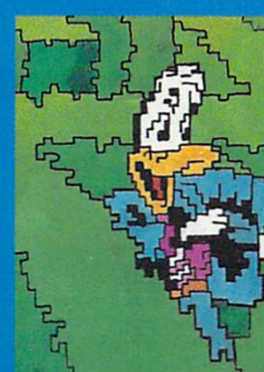
CONTENTS

commodore MAGAZINE

DEPARTMENTS

FEATURES





LETTERS

Personal Publishing

To the Editor:

Having recently purchased a copy of GEOS, I was particularly interested in the article on desktop publishing in your February, 1987, issue.

I think perhaps you'd be interested to know that I've found a method for text composition with GEOS that is fast, simple and inexpensive using my dot matrix printer (Star SG10C) and a copy machine with a reduction mode. I simply compose the desired text in a large point size—18 points or larger—which yields well formed characters even on an inexpensive printer such as mine. I then reduce the copy on my office copier to about half its original size which results in very readable text.

I've used this method in preparing paste-ups for inexpensive brochures used by our neighborhood community center. I use several other graphics programs along with press-on lettering for headlines and combine the text with graphics from a variety of sources. The result is a simple publication that is prepared quickly at a very minimal cost.

I've tried other methods from typewritten copy to typeset text. Typed copy is, for lack of a better description, somewhat one-dimensional and lacking in visual appeal. Typesetting, for our purposes, is too expensive and doesn't adequately allow for inevitable last minute changes. The method I've described is an ideal alternative. It may not produce text of the clarity and quality that may be desired for printing of a more permanent nature, but I think that other individuals and groups with similar requirements and constraints may find it to be an effective solution.

I look forward to more articles about desktop publishing and particularly those which deal with ideas and methods which employ an economy of means. Perhaps other readers may be encouraged to share their own efforts in this regard.

Joel Downey
Pittsburgh, Pennsylvania

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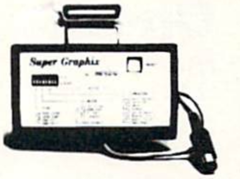
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COMMODORE'S NEWS FROM THE FRONT

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Most of the game programs for the Commodore 64 and 128 provide fascinating sound, but there's only silence if you use a soundless monitor. Soundbox is the ready to plug-in high-fidelity amplifier with a built-in speaker. It is connected like an expansion battery power supply and includes all cables. Soundbox retails for cable between computer and monitor and contains a 4 UM3-type $39. (TecTrans, W. Guertzgen, 6925 Rosemead Boulevard, San Gabriel, CA 91775, 818-285-3121)

Amateur Radio

Hams interested in studying for or upgrading to the FCC Technician/General Class license by computer can now obtain a study course with sample examinations on disk for the Commodore 64 for $12.95 postpaid. A version for the Advanced Class license is also available. (Dr. G.F. Schilling, AI6I, 37251 Sage Road, Hemet, CA 92343)

Panic Button

Today's computers store information, print mailing lists—and beat us at chess. They also bring frustration to anyone learning the complexities of them. Enter the Panic Button. This bright red computer key is imprinted with the word PANIC and has an adhesive backing which attaches the key instantly. They are available from Memory Makers (3024 Haggin Street, Bellingham, WA 98226, 206-734-9506) at two for $2.50.



Yellow Page Listings On-Line

The Instant Yellow Page Service lets you dial in and retrieve business listing on-line from a data base of over 13 million Yellow Page listings. Any personal computer with a modem can be used to access the Instant Yellow Page Service. Charges are $1 per minute for connect time, plus 10 per record printed or displayed. A pre-paid subscription fee of $95 for the first year ($60 annual renewal) is also required.

The Instant Yellow Page Service has offered readers of **Commodore Magazine** a sign-up offer of $100 free usage when they mention this publication. (Instant Yellow Page Service, 5707 South 86th Circle, Omaha, NE 68127, 402-331-7169)

Keyboard Cartooning

Lockhart Development has released **Keyboard Cartooning** for the Commodore 64, a program that lets you create cartoon figures, animals and vehicles and then animate them with sound.

The demo disk includes animated cartoon examples that demonstrate how these characters, captions and sounds can interact to produce one- to three-minute animated cartoons. This same technique can be used to animate program titles and games.

Keyboard Cartooning retails for $12.95. (Lockhart Development, P.O. Box 214, Palm City, FL 33490, 305-287-7760)

Volleyball Update

In the March, 1987, issue of **Commodore Magazine**, Artworx Software's volleyball game for the Commodore 64 was incorrectly

Continued on pg. 10

Continued from pg. 8

identified as **Beach Ball Volleyball**. The correct title is **Beach Blanket Volleyball**. Artworx Software also has a new address: 1844 Penfield Road, Penfield, NY 14526. Their new telephone number is 716-385-6120.

Commodore Computers in Hollywood

In the March, 1987, issue of **Commodore Magazine**, New Horizons Software was listed at an incorrect address. The correct address is P.O. Box 43167, Austin, TX 78745. Their phone number is 512-329-6215.

Interactive Comic Book

Accolade has released **Accolade's Comics**, the first interactive comic book for the Commodore 64. Featuring two distinct themes and dozens of major and minor storylines incorporating eight arcade-like games, **Accolade's Comics** is the story of a spy named Steve Keene whose mission is to foil evil plots for the chief of Spystuff, Inc.

The player determines the direction of the story by continually selecting from a series of possible answers to questions asked of Keene—some are dead ends, other lead the player into various themes and storylines. The arcade-like games are accessed when Keene falls into traps, inescapable positions and embarrassing situations.

Accolade's Comics retails for $39.95. (Accolade, 20833 Stevens Creek Boulevard, Cupertino, CA 95014, 408-446-5757)



Hayes-Compatible Modem

Trans Com has introduced the TCM-1200H Hayes-compatible modem for the Commodore 64 and Commodore 128. It features auto-select 300-1200 baud and originate/answer modes, and includes eight LED status indicators and eight dip switches on the back panel, one of which is an auto-answer disable switch, keeping the modem from answering the phone when not in use.

Besides the full set of Hayes AT commands, the TCM-1200H is both Bell 212 and CCITT v.22 compatible. It requires no RS-232 interface to connect to the computer and is powered from the computer, eliminating a power pack. Other features include a speaker with level control, two phone jacks, computer connecting cable, and tone or pulse dialing.

Software is included for both the 64 and 128 along with a QuantumLink starter kit (QuantumLink is a Commodore-specific telecommunication service). The TCM-1200H carries a two-year warranty. Suggested retail price is $179.95. (Trans Com, 703-13 Annoreno Drive, Addison, IL 60101, 312-543-9055)

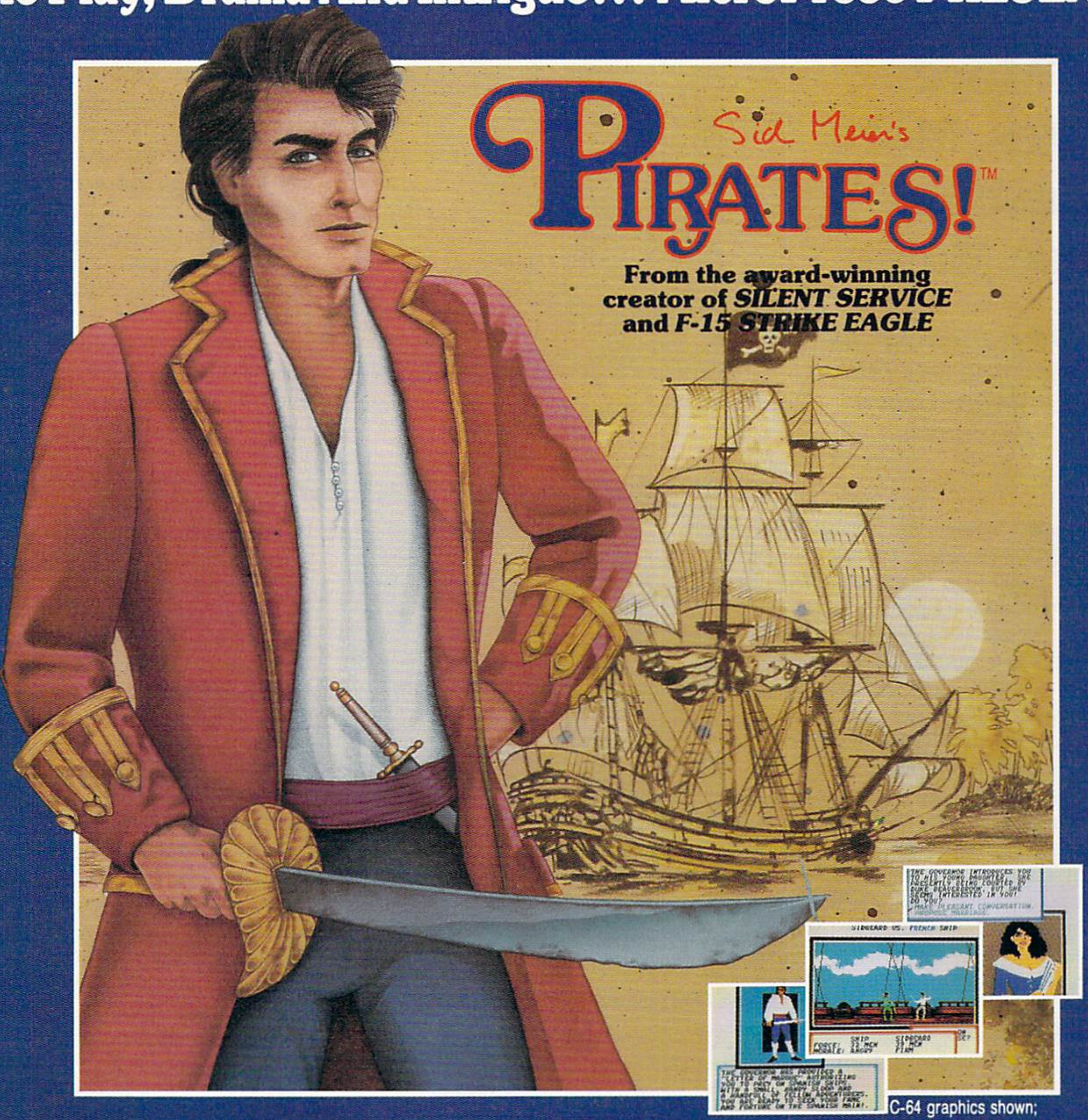
Create a Calendar

Epyx has the answer to all those forgotten dates. **Create a Calendar** for the Commodore 64 lets you design your own daily, weekly, monthly or yearly calendars through the year 9999.

Create a Calendar offers an assortment of calendar types and a variety of decorative fonts, borders and graphics. In addition, graphics from the Epyx **Graphics Scrapbook** series and Broderbund's **The Print Shop** can be used in your calendar.

Retail price was not available for publication. (Epyx, 600 Galveston Drive, Redwood City, CA 94063, 415-366-0606) ■

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C-64 graphics shown; Actual screens may vary.

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BY SHAY ADDAMS

The Bard's Tale II—More Mazes, More Monsters, More Magic

News and opinion from a leading explorer of those fantasy realms called adventure games.

When I'm wrong, I'm wrong. I predicted *The Bard's Tale II: Destiny Knight* would be easier than *The Bard's Tale*, but it turned out even tougher. It is easier in the early stages because the monsters don't attack as frequently while your party of six warriors and spellcasters stroll about town. And a starter maze is available for rapidly developing new characters if you don't have some from *Ultima III* or *The Bard's Tale* to transfer into this game. But once you leave the first town, the monsters get meaner and the mazes more mystifying.

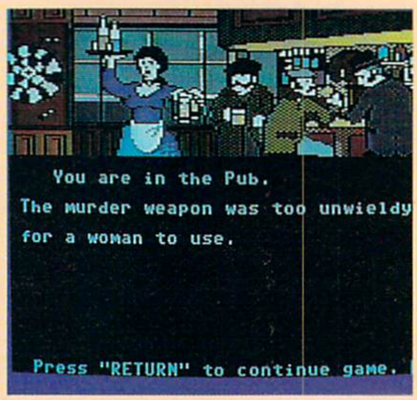
Notice I said first town? There are six cities instead of one, plus a vast wilderness area separating them. It's refreshing to escape those stuffy dungeons and wander around in the open air for a change. And speaking of dungeons, you'll find 25 monster-filled mazes that must be accurately mapped on graph paper if you ever hope to complete the quest. This time you're seeking the seven pieces of the Density Wand, which Logoth Zanta, an evil wizard, hid in many different places across the land. Only after obtaining them will you be ready to confront the villain. And only after defeating him can you reforge the Density Wand and restore peace to the realm.

The fragments of the Wand are hidden in real-time Snares of Death puzzle rooms in which your entire party dies if you don't solve the problem within a time limit. (There are also standard puzzles demanding that you possess specific items or type in a password.) This is a major innovation for role-playing games.

Another novelty is the combat system's ranged combat. A message tells you how far away the monsters are when you first see them. If they are more than ten feet away, you can't hit them with swords or halberds, but must resort to missile weapons such as spears or arrows. This calls for even more tactical planning during combat than was required in the original game, another reason *The Bard's Tale II* is considerably more challenging.



The Bard's Tale II



221 B Baker Street

Spells are also affected by distance, and the manual notes each one's range as well as its effects. There are 79 spells this time (many of which are new), and a new magic-using class, the Arch-Mage. The Bard sings a new medley of tunes with magical effects and is as thirsty a character as ever.

The interface and visual presentation—lots of spot animation and lush graphics—remain true to *The Bard's Tale* and disk access is much faster: 15 seconds to load a dungeon. Other enhancements include the ability to rename characters, a bank for safeguarding your gold, a casino for squandering your gold, summon monster to become permanent party members, a Sage who provides clues, and lots of new monsters and graphics.

London Calling

After a few grueling weeks in *The Bard's Tale II*, I teleported to London and cabbed over to *221 B Baker Street*. I've played so many Sherlock Holmes games that I didn't expect much from this trip, but came away convinced that this is the best game Intellicreations has ever done. It combines elements of the graphic adventure with those of a board game.

One to four people can play, though it is more fun with a group. Each chooses to be Holmes, Watson, LeStrade or Irene Adler and then selects one of 15 cases. The town appears laid out like a checkerboard—buildings rise in simulated 3D from squares. A different animated character represents each player. When you hit the button or spacebar to roll the dice, a number tells how many squares you can move across the grid that turn.

When you enter a building, a full-screen illustration and text will offer a clue. Some are Identity Clues, like "Lions live in them" as a clue in the Pharmacy. In the Pub, where a voice-synthesized waitress greeted me by saying "What's your pleasure?", I got a Motive Clue: "Jimmy Carter's daughter." Other clues are general in nature: "Holmes spotted a pink substance on Willie's fingertips." Some clues are revealed in the accompanying case book, which reveals vital background data on the people involved.

In multi-player games, clues are presented in code so players can't read each other's discoveries. These are scrambled messages that you decipher with one of four codes printed in the manual. Part of the fun lies in trying to decode other people's clues. If you think someone has done that to yours, you may change codes by visiting the carriage house, which also permits you to travel directly to any location.

Once you think you can solve the crime, you can take a multiple choice quiz that asks you to name the killer, motive and method. You'll need a badge from Scotland Yard to take the quiz, and

Continued on pg. 94

Tips & Tricks

Hints for Fun and Utility

COMPILED BY LOUIS F. SANDER

This month, as usual, we bring you a potpourri of tips and tricks, amusements and delights. They come from Florida to California and from Canada to Argentina, with an exotic Israeli utility thrown in. Whether you're a game player or a programmer, there's something here to amuse you, to inform you, and to move your computer life onto a higher plane. If you think your own short item belongs in this company, send it to:

Louis F. Sander
P. O. Box 101011
Pittsburgh, PA 15237

We pay from $10 to $50 for each item we use in the column. Plus, it makes you famous.

QuantumLink communications: I am very active on the QuantumLink telecommunication service and am always happy to make contact with readers of this column. My Q-Link screen name for this purpose is LFS. I'd like to hear from you, especially if you have something to say about our efforts in this magazine.

If you'd like to make an on-line submission of your hint or suggestion, send it to me via E-Mail in the Q-Link Post Office. I'll publish the first usable hint received after this appears in print, and I'll give special consideration to any others received on-line. Please use the LFS screen name here, too.
Louis F. Sander
Pittsburgh, Pennsylvania

Keyboard cleaning: A quick and effective way to clean between your keys is to use a piece of wide masking tape. Fold it over on itself sideways so about half the piece is sticky and about half is thicker and folded over. Holding the folded side, run the sticky side down between the keys where it will collect the dust, dirt and hair that's accumulated there. If you do this every few months, you won't be troubled with intermittent keys.

If you already *have* some keys that don't work, or that work intermittently, it's not too difficult to clean up their internal workings *if* you're a careful worker. (If you've never worked on electronic equipment before, get help from a friend who has. LFS) These instructions apply to the 64, but the principles apply to the 128 and all other Commodore machines.

Remove the three screws on the bottom of your computer and carefully separate the top and bottom shells. **[WARNING: OPENING YOUR COMPUTER VOIDS YOUR WARRANTY.]** Now gently separate the connector for the LED power light and the much larger one for the keyboard. Carefully de-solder the two wires going to the shift-lock key, and you're ready to disassemble your keyboard. Remove all the tiny screws you see on the back of the keyboard assembly, carefully setting them aside in a safe place. When the last screw has been removed, you can lift off the back of the keyboard assembly. At this point, you'll probably see the gunk that's giving you your problem. Remove it, then use a soft cloth and some cleaning fluid to wipe off the printed circuit board inside the keyboard. Be careful, gentle and observant, and everything will go well.

When everything is clean and dry, reverse the disassembly process. Test every key on the keyboard, then stand by for years of trouble-free keyboarding.
Viet Ho
Pasadena, California

Cheap cleaning fluid: When the liquid that came with my disk drive cleaning kit was left open, it evaporated and I couldn't find any replacement fluid. When I looked at the listed ingredients, I found that this fluid was primarily isopropyl alcohol.

Since then I have been using isopropyl alcohol from the drug store. It has 91% purity (compared to 70% in the original fluid) and has no coloring or other additives. It works great in my head cleaning kit, and I also use it to clean the rubber platen on my printer. It's about a dollar a pint at any drugstore. (Isopropyl alcohol also makes a good keyboard cleaning fluid. LFS)
Joshua Schulman
Valley Stream, New York

Computer widow's delight: Being a computer widow, I rarely find any interest in what my husband or children do with the computer. However, when I saw my husband disposing of reams of used computer paper, I realized that it could serve as a great liner for my microwave oven.

I just hang the fanfold paper around the perimeter of the oven, using the unremoved tractor holes to hook onto the oven's interior frame. When the paper catches enough splatter, I replace it. It doesn't burn, doesn't affect the operation of the oven, and best of all, it's free. Who says a home computer can't be useful?
Harriet Schulman
Valley Stream, New York

***Seven Cities of Gold* tip:** Did you ever lose an expedition because you couldn't find your ship? It's enough to make you swear off this game for good. I avoid the problem by always parking my ship next to a major river. Then if I need to get back in a hurry, I just find the river and follow it back to the ship.
Jeremy Hubble
Belton, Texas

***Bop'n Wrestle* hint:** When taking out your opponent in the one-player version of this great wrestling game, wait until he's facing you, then give him a fast body slam. Go for a quick elbow drop, then wait for him to recover. Repeat the body slam and pin him for the win. Who *says* computers are for pencil-necked geeks?
Alex Quevedo
Address Unknown

Continued on pg. 104

COMMODORE OWNERS... YOU ARE ABOUT TO BEGIN A WONDERFUL NEW LOVE AFFAIR!

Since the beginning of the computer boom, folks have been saying what they would *really* love is a program *anyone* can use to perform *everyday* tasks.

PARTNER 64, a cartridge-based product with eight convenient, *memory-resident* desktop accessories, does just that.

Like Sidekick*, PARTNER automagically suspends the existing program in your computer while you are using the PARTNER accessories. When you are through, press a button and PARTNER returns you to the point in your program where you left off.



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- **Auto Dialer:** At your command, the computer will search through your list for the number you want, and automatically dial the number for you.**
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- **SwiftDOS:** Allows you to access Commodore disk drive commands any time.
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**An auto-dial modem is required to use the phone dialer feature.

BY JOHN IOVINE

Interfacing Commodore's User Port, Part 2

In Part 2 of this series on how to make the user port work for you, we will build a speech synthesizer for the VIC 20, Commodore 64 and 128.

In part one of this series, we experimented with the user port. We found that we could effectively output voltages (binary 1 or 0) and read input voltages (binary 1 or 0) on any of port B pins by peeking and poking the ports registers. Using simple logic instructions within BASIC, we learned to check or change the status of a single bit on the port without disturbing the status of any other bits. In short, we gained a useful insight into the processes of the user port, its simplicity, its complexity, and in part, its relationship to the computer system.

This month we will apply what we have learned in a practical application—synthesizing speech.

Speech synthesizers (or processors) appear in two main formats. One approach (format #1) uses digitally recorded speech stored in a ROM chip. The second approach (format #2) uses phonemes of English to construct words and sentences (a phoneme is a speech sound).

The main advantage in format #1 is excellent speech reproduction and fidelity. Its main disadvantage is a limited vocabulary of English that's been preprogrammed into the chip.

Format #2's strength is format #1's weakness: an unlimited user-defined vocabulary. Its disadvantage is that the speech fidelity isn't as good as with the preprogrammed speech ROM. Even so, the speech fidelity of format #2 is quite acceptable in all but the most critical circumstances. This article is taking this second approach to speech synthesis.

The speech synthesizer we will build plugs into and is powered by the user port. The cost is less than $25, and includes its own audio amplifier, filter, volume control and speaker. Since it has an unlimited vocabulary, you can program any word you desire. You then have the option to either modify existing programs to include speech, or, of course, to write new programs with speech.

The Speech Chip

General Instruments Company manufactures the 28-pin speech synthesizer chip (SP0256-AL2) that is distributed by Radio Shack.

This chip can generate 59 allophones (speech sounds) and five pauses (no sound) of various lengths (see allophone table). By adding (concatenating) allophones together, you can construct words and sentences. This may sound rather difficult at this point, but it's not—the program does most of the work.

An allophone is the computer equivalent to English phonemes. There are two main points you should keep in mind when programming words. First, in English there isn't a one-to-one correspondence between letters and sounds. This point is amply demonstrated by the younger members of our society who are learning to read and write. They are likely to spell cat as kat and phone as fone, imitating in writing the way the words are pronounced. This is a very interesting point, because in order to program words to sound correct, you must spell the words phonetically. More about this later.

Placement of a speech sound in a word can change the pronunciation. As an example, take a look at the two d letters in the word depend. The d's are pronounced differently. If we were to program this word using our table of allophones, the allophone DD2 would sound correct in the first position (Depend) and the allophone DD1 sounds correct in the second position (depenD). We will return to programming technique later on. A booklet with more information on linguistics, allophones and usage is included with the speech synthesizer chip.

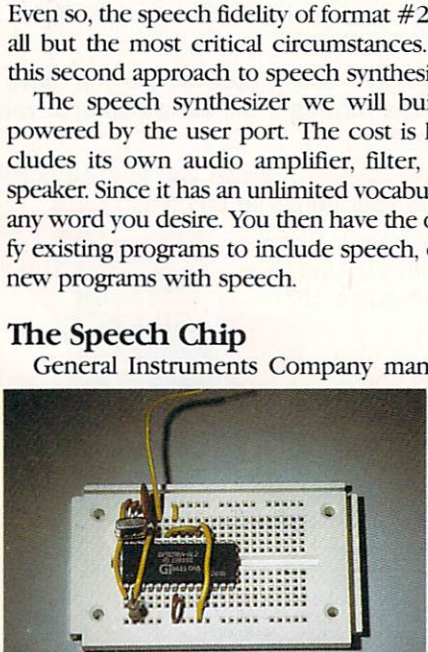
Circuit Construction

Two sections of the circuit are shown, separated by a dotted line. Section A on the left is the basic circuit. Section B contains the amplifier, low-pass filter, volume control and speaker added to the basic circuit.

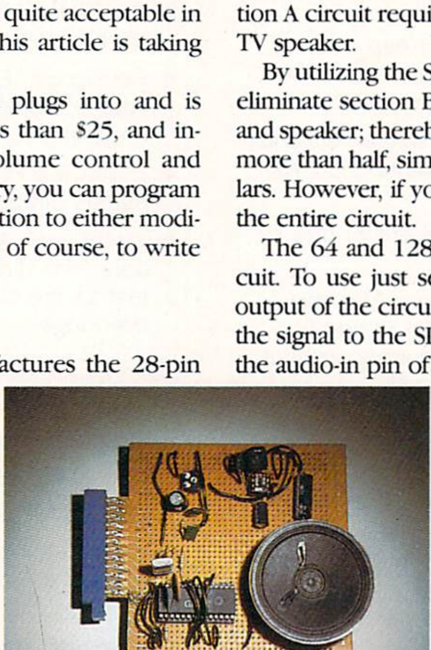
The two sections A and B together make up the entire circuit, which is a stand-alone unit (meaning it requires only control signals from the user port to function). In contrast, the section A circuit requires the use of the SID chip and a monitor or TV speaker.

By utilizing the SID chip in the 64 or 128 computer, you can eliminate section B, the audio amplifier, filter, volume control, and speaker; thereby reducing the amount of parts required by more than half, simplifying the circuit, and saving a couple dollars. However, if you're using a VIC 20, you will have to build the entire circuit.

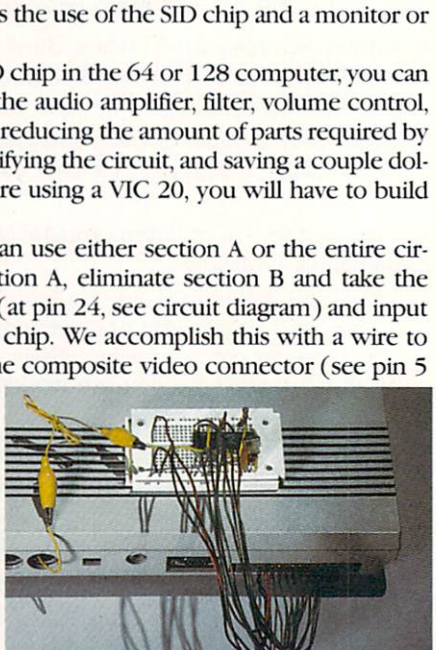
The 64 and 128 can use either section A or the entire circuit. To use just section A, eliminate section B and take the output of the circuit (at pin 24, see circuit diagram) and input the signal to the SID chip. We accomplish this with a wire to the audio-in pin of the composite video connector (see pin 5



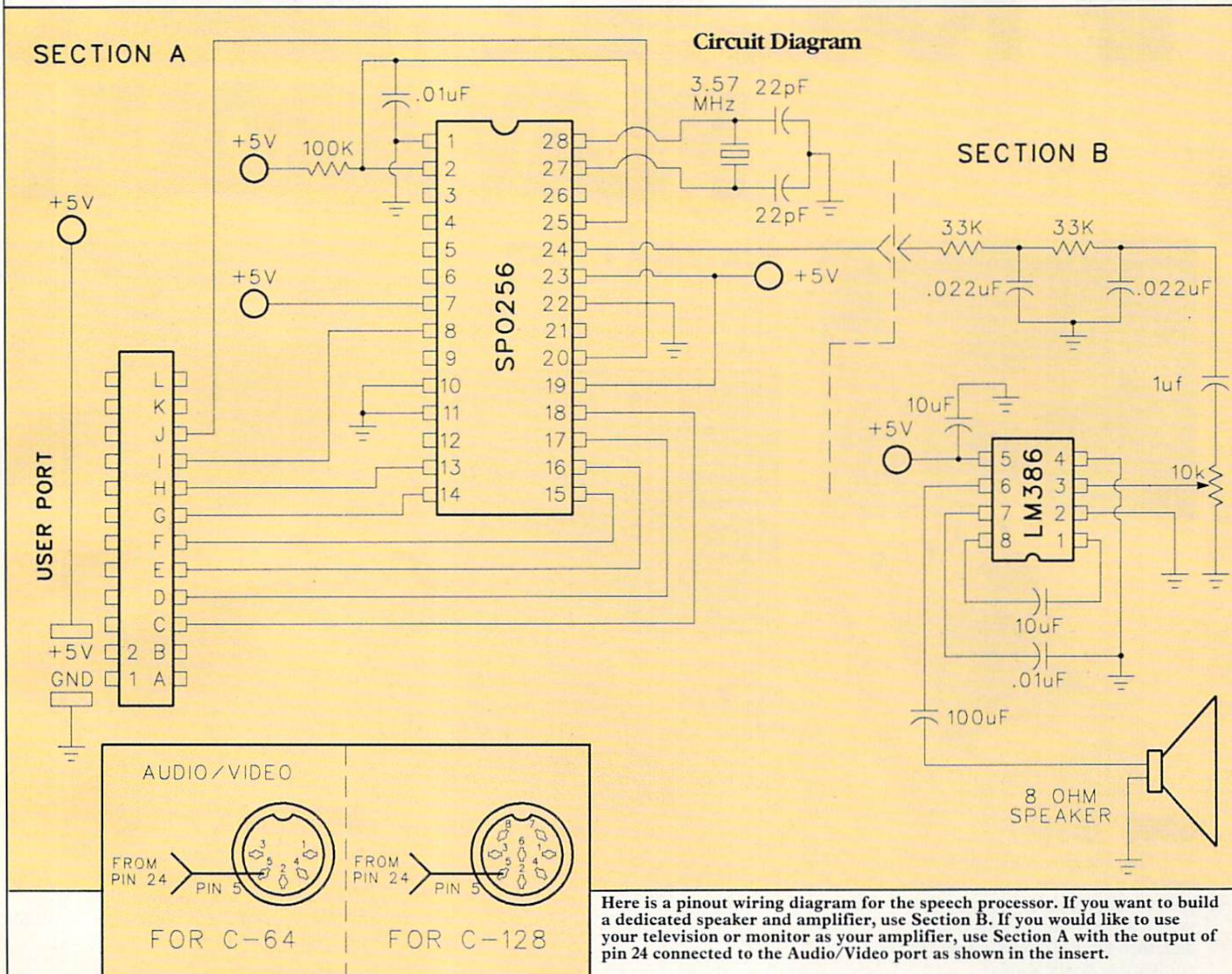
A completed breadboard of Section A of the circuit.



Sections A and B constructed on a modified experimenters board.



Section A breadboard connected to the user port, with connection to video/audio port for sound.



Here is a pinout wiring diagram for the speech processor. If you want to build a dedicated speaker and amplifier, use Section B. If you would like to use your television or monitor as your amplifier, use Section A with the output of pin 24 connected to the Audio/Video port as shown in the insert.

of the 64 and 128). Pin 24 is the digital output of the speech synthesizer chip. You can purchase the correct din plug for your computer or use a short wire pushed into the correct pin socket connected by a jumper wire to pin 24. If you built the circuit described in the last month's installment, you can use the breadboard for this circuit (see photo). Plug in your components as diagrammed and you're ready to begin programming.

For the VIC 20, I constructed the entire circuit on a modified experimentors card. The card is modified by cutting the end terminals on both sides leaving the center 12 positions. Use a 12/24 card connector and solder the lugs on the connector to the fingers on the board. If a 12/24 card connector isn't readily available, you can modify a 22-position card connector into a 12-position connector by cutting off 10 positions as I have done (see photo). Only 10 connections are needed for this project. I did, however, solder all the connections to improve the mechanical strength of the unit.

Pin 24 is connected into the B section circuit to a low pass audio filter to a 10K volume control pot. Use either a trimmer pot that you can set once and forget about or eliminate the pot completely. The volume of sound with the pot removed isn't so great to be objectionable. You'll probably use the speech synthesizer with the pot fully closed anyway.

Power is available from the top side of the user port (see diagram). This is the +5 volts and additional GND wires soldered on your card connector last time. The bottom side (port B) accesses and controls the speech processor. If in wiring you get confused tracing the leads from the user port to the speech chip, I suggest holding the card connector (or experimentors board) to the diagram of the user port (see photo). This will help match where each wire connects. The diagram of the user port can be used this way because it shows how the user port appears when looking directly into it from the back. When completed, the card connector plugs into the user port (see photo).

The manufacturer of the speech chip recommends using a 3.12 MHZ crystal at pins 27 and 28. I recommend using a 3.57 MHZ color burst crystal instead. The reason is cost and availability. The 3.57 MHZ color burst crystal is approximately 1/4 the cost of the 3.12 MHZ crystal, and is more readily available. This change will increase the timbre of the speech slightly, but has no other effect on circuit operation.

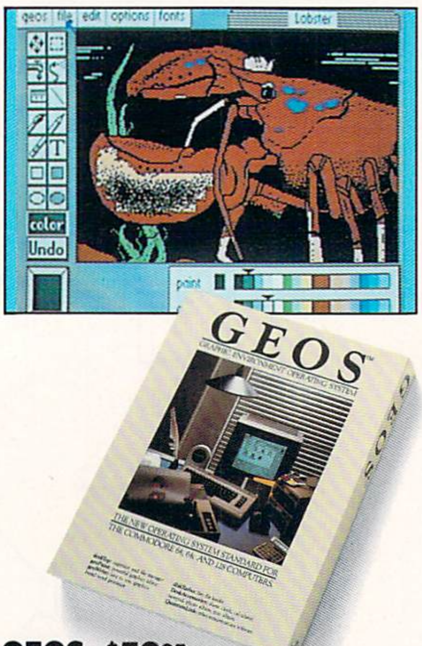
The Program

Type in the program as shown. Assign a value to PB in line 60 according to which computer you are using.

For the VIC 20 PB=37136

Continued on pg. 114

IF YOU STILL THINK CO
PLAY AROUND



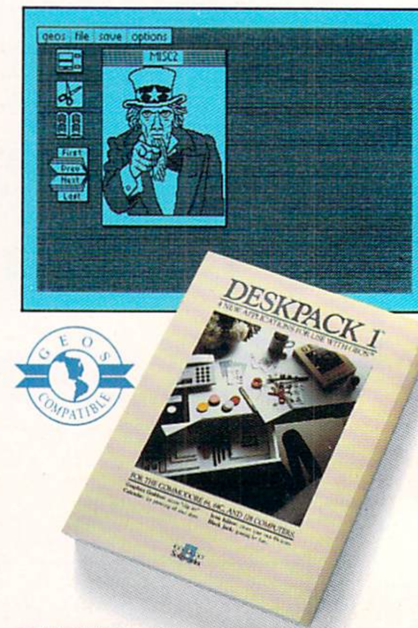
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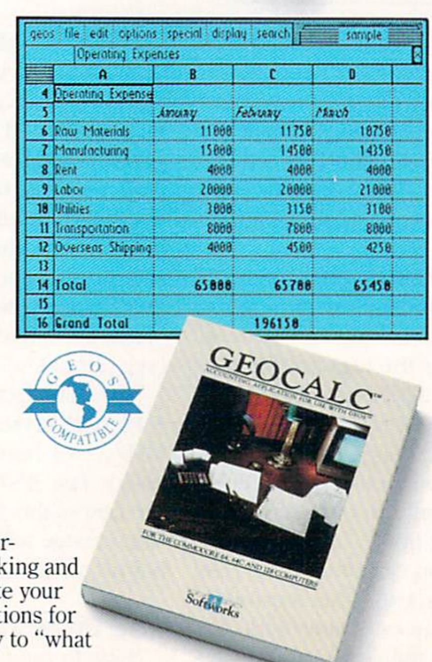
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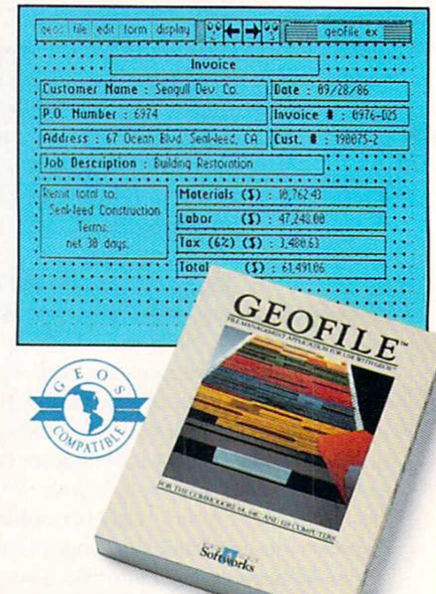
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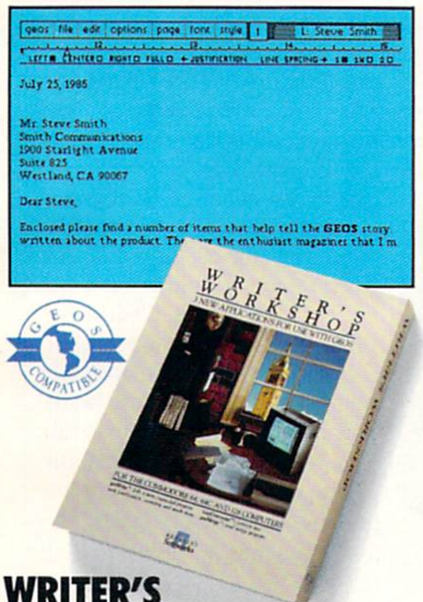
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MMODORES ARE TOYS, WITH THESE.

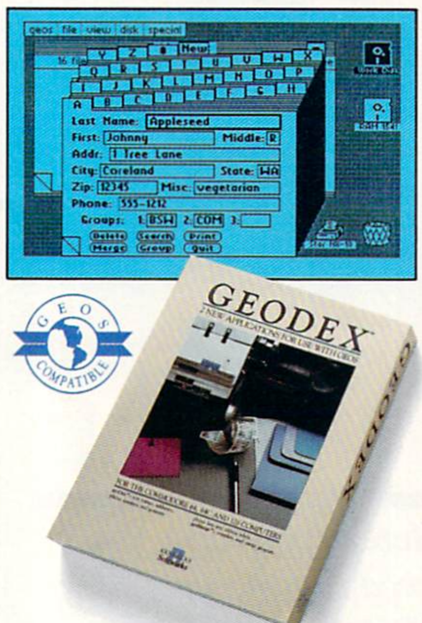


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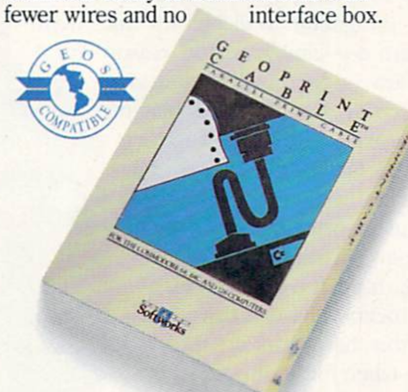
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BY JEFFREY HERSK

How to Keep Your Drive Alive

Easy Maintenance for the 1541



The 1541 disk drive is the most widely used peripheral available for the Commodore 64—and for good reason. For a very low price, this little unit saves and retrieves millions of bits of data, usually without a single error. This is what we expect of it, of course, because one little bitty bit out of place can turn your program or data file into worthless garbage. It is a big job for a little inexpensive disk drive, and yet, this hard-working tool is often taken for granted. You certainly wouldn't drive your car for thousands of miles without checking the oil or the tires. That would be asking for trouble. Expensive trouble.

Well, a disk drive, like a car, has many moving parts that are subject to wear and require periodic adjustment and lubrication. In the course of this article, you will see that the average non-technical Commodore owner can do a lot to prolong the life of the 1541.

Here's everything you need to tune up your 1541.

Love Your Disks

Of course, the first step toward prolonging drive life begins long before you turn a single screw. It begins with how you treat your drive and your disks. Disks are a reliable, sturdy storage medium, but they are sensitive to magnetic and electrical fields, temperature extremes, pressure, bending and dust. As far as your drive is concerned, it is the dust (this includes cigarette smoke) that does the damage. Needless to say, it is important to keep your disks as dust-free as possible. Your disks have a built-in protection system, a dust-catching liner, which sweeps dust particles off the disk surface as it rotates in the drive. However, this system can be easily overloaded by excess dirt and dust on the disk. Excess dirt can cause dirt build-up on the read/write heads and scratches on the disk surface.

Here is a tip for all you hot-shot hackers who like to get extra disk mileage by notching your single-sided disks and using the reverse side—don't do it! Imagine the liner material efficiently collecting dust from the disk surface as it revolves. Now imagine what happens when you flip the disk over and rotate it in the opposite direction. Right! All that dirt build-up on the liner gets distributed back onto the disk surface. If this dirt contains little nibs of cardboard created when you cut your notch, you have real problems. And all this to save the cost of a little floppy that could last years with proper care!

Clean Your Head

"Alright, alright," you say, "I'm convinced. Disk drive maintenance is a necessity. But where do I begin?" Well, the most basic care you can give your drive is to clean the read/write heads.

Head cleaning is necessary to remove oxide deposits that build up on the leading edge of the heads. How often do the heads need to be cleaned? The manufacturer gives no recommended cleaning intervals, and it seems every expert has a different opinion. The extremes I have heard range from weekly cleaning to no cleaning at all until read errors occur. The happy medium seems to be a four- to six-month interval between cleanings with average use. The heads should be cleaned more often if the drive is used in a dusty or smoke-filled room. If you wish, you can use one of the many head-cleaning disks on the market. Be sure to choose a non-abrasive cleaner. These products usually require you to apply a solvent to the cleaning disk and then allow it to spin in the drive for about 30 seconds. While these disks do an adequate job in most cases, you can do a more thorough job by cleaning the heads manually. Also, while you are inside your drive, you can perform some other simple but very important maintenance chores.

Begin by assembling all the tools

Continued on pg. 22

CAUTION

If you bought your disk drive within the last 90 days and you open the case, you will void the warranty which you may need should major problems arise.

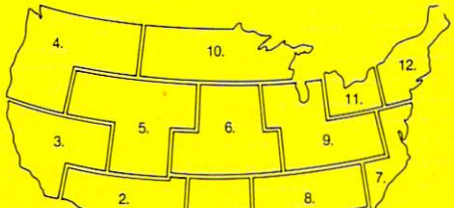
The disk drive contains some very delicate parts which can be damaged if handled improperly. In particular, there are several NMOS chips which are very sensitive to static electricity. A small charge that you may build by just walking across a carpeted room could be enough to fry one of these chips. For this reason, it is very important that you ground yourself before working on the drive.

You do this by touching any metal object which is electrically grounded, such as a metal outlet strip or the base of a metal lamp. Any electrical appliance with a metal case and a three-prong plug is grounded. This precaution is not meant to frighten you; only to save you the frustration of doing more damage than good.

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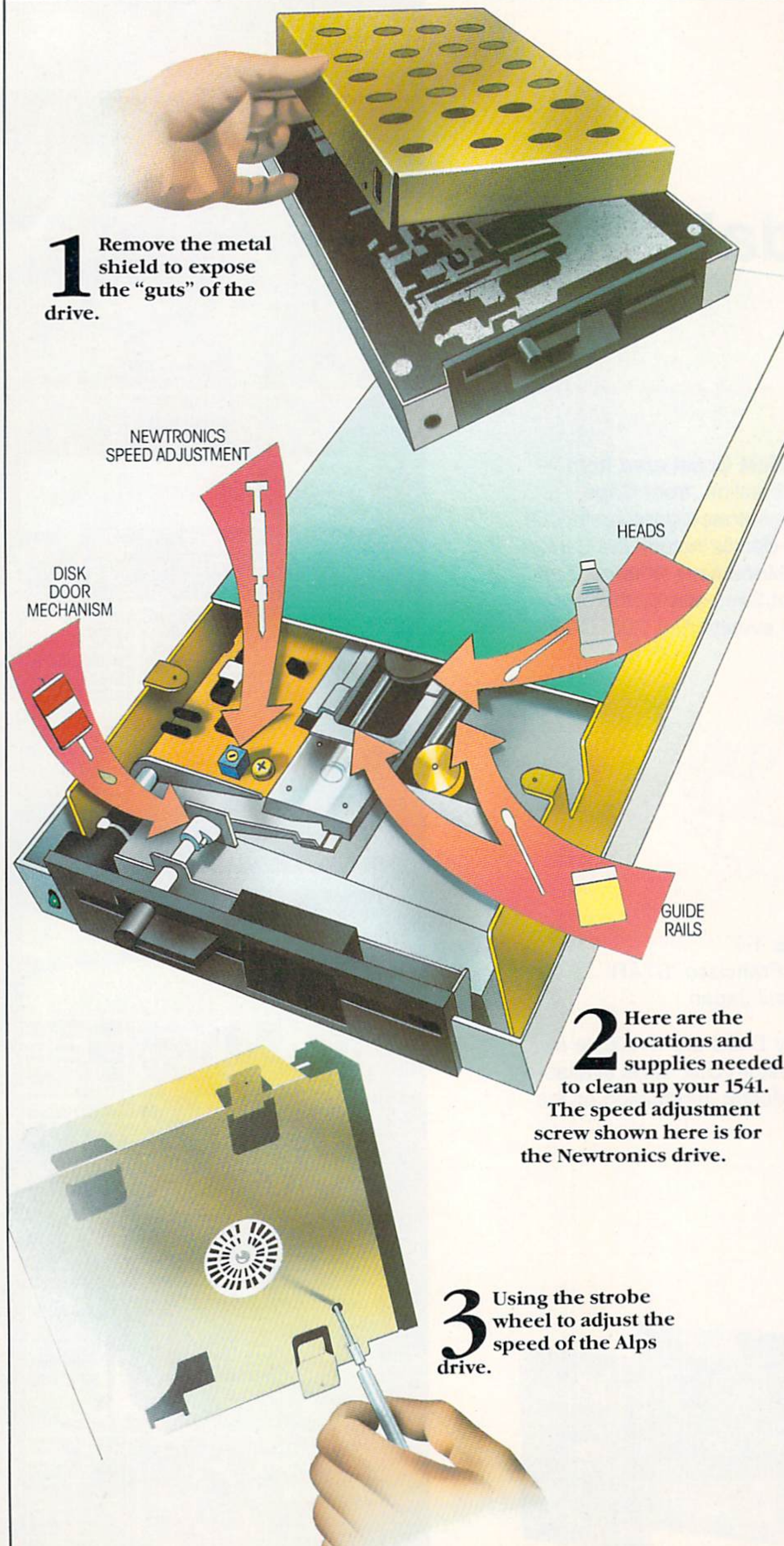
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1 Remove the metal shield to expose the "guts" of the drive.

2 Here are the locations and supplies needed to clean up your 1541. The speed adjustment screw shown here is for the Newtronics drive.

3 Using the strobe wheel to adjust the speed of the Alps drive.

Continued from pg. 20

shown on page 20. Remove the power and serial bus cables from your drive and set the drive upside down on your workbench. Remove the four screws holding the case together, then turn the drive over and remove the top of the case.

This would be a good time to make sure you are at ground potential by touching ground as described earlier. That done, remove the two screws which hold on the metal shield. These are on your left if you are looking at the front of the drive. With the screws removed, the shield will swing up to your right and can be removed. Now the heads are visible. If you are not sure where to look, open and close the drive door and you will see the heads opening and closing at the same time.

To clean the heads, hold the upper head up and wipe both the upper and lower surfaces with a lint-free swab which has been soaked in alcohol. That's all there is to it!

Lube Job

Now for a little vital lubrication. Use another swab to apply a thin film of petroleum jelly to the read/write head guide rails. These are the shiny bars running horizontally on either side of and slightly beneath the heads. The heads move in and out on these rails as it moves to the various tracks on the disk.

Finally, apply a tiny amount of sewing machine oil to the moving parts of the disk door mechanism. Again you can see which parts need lubrication by working the disk door and watching the action. Moderation is the key here. You don't want any excess oil that might find its way onto a disk surface someday. One drop, distributed with your swab, should be enough to lubricate all the moving parts of the drive door.

At this point, you should be feeling encouraged by how easy all this is. Aren't you glad you didn't pay a high-priced technician to do it for you?

Check Your Speed

The next step of our journey is the speed adjustment. The rotation speed of the drive is crucial to its proper operation. If the speed is off by more than about three percent (ten rotations per minute above or below the optimum 300 rotations per minute), errors begin.

At this point you must determine which model of drive you have. The

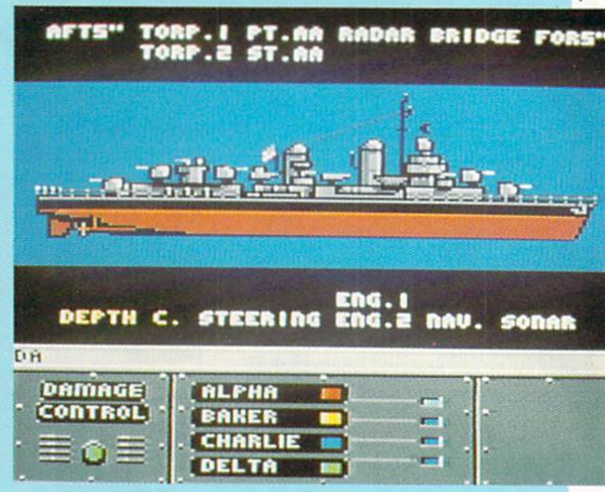
Continued on pg. 116

REVIEWED BY SCOTT A. MAY

Destroyer

Computer: Commodore 64
Publisher: Epyx
600 Galveston Drive
Redwood City, CA 94063
Medium: Disk
Price: Not available for publication

The placement of islands and enemy forces is entirely random, so each game is unique.



You are on routine patrol in the South Pacific during the latter stages of World War II. Reconnaissance planes report enemy activity on a small island due south of your position. As you near the coral reefs, radar reports a squadron of planes off the port side and an enemy ship to the north. Before you can react to either threat, an unseen island emplacement begins to shower the deck with shells.

This intense scenario is just one example of the many you will face in *Destroyer*, a naval combat game from Epyx. The action unfolds in real time, with 3D graphics and bone-jarring sound effects. *Destroyer* is one of the best action-packed war games since Bruce Carver's classic *Beach-Head*.

However, unlike *Beach-Head*, which relied mostly on arcade skills, this one-player contest offers a realistic blend of action and strategy that is both mentally and physically challenging. For designer Michael Kosaka, the director of computer graphics at Epyx, *Destroyer* represents his finest work to date.

Before the game begins, you are asked to enter a name for the ship and its captain. You are then taken to the play selection screen to choose from seven different scenarios and three skill levels. These two factors will decide the overall objective of each game. In general, the skill levels (easy, intermediate and advanced) affect the speed, size and skill of the enemy forces.

The seven scenarios offer increasingly difficult objectives, with more of your ship's battle stations called into play. In addition, the placement of islands and enemy forces is entirely random, so each game is unique. The combination of skill levels, scenarios and random elements assure long-lasting play.

As a training exercise, novice players should work their way through each scenario at the lowest skill level. Here the enemy forces are relatively weak and you will soon gain your sea legs in every station on the ship. Only practice will prepare you for the onslaught that awaits in the higher levels of play.

The 13 battle stations depicted in *Destroyer* include the bridge, navigation, observation deck, radar, sonar, the main 5″ guns (fore and aft), anti-aircraft guns (port and starboard), torpedoes (port and starboard), depth charges and damage control. Each station is completely functional, controlled with easy-to-learn joystick commands. A message line, which also serves as an intercom, appears on each screen. To move from one station to another, simply type a two-letter abbreviation and press RETURN. During the course of play, this message line will serve as your link to the crew members at each station.

As play begins, you are given battle orders outlining your objectives, enemy activity and target coordinates. From here you are taken to the large navigation map with an overhead view of the islands and your ship. You may plot up to four course destinations which may be changed at any time. The quartermaster will announce over the intercom when each checkpoint is reached.

The bridge and its incredible array of dials and switches is the brain of the ship, with controls for every station on board. It is possible to fight entire battles from the bridge, but you would lose valuable training and miss most of the fun.

At the flick of a switch, the captain can obtain reports from sonar, radar and damage control. Helm controls can be either manual or automatic, controlling the ship's speed and heading. During the heat of combat, pursuit and evasive actions may also be ordered. Finally, several switches allow you to change the crew's status and degree of weapon readiness. Use the command for general quarters sparingly, however, or your crew will tire and react poorly in battle.

The observation deck is an essential station that provides a 360-degree view of the immediate area. Using remote helm controls, the captain can make valuable course corrections after obtaining visual contact. Use this station when approaching an island to prevent grounding in shallow waters.

As an aid to navigation in the event of enemy contact, helm controls are also present in both the radar and sonar stations. The radar sweep will pick up all islands, ships and planes within a 13,500-yard radius of the ship. The sonar screen covers the same area, tracking islands, submarines and incoming torpedoes. Both stations will report the direction and distance of all enemy targets.

The 5″ main guns, both fore and aft, are used to sink enemy ships and shell island emplacements. Digital indicators are used when adjusting the trail (horizontal) and point (vertical) movements of each

gun. Unless you're a crack shot from a mile away, take advantage of special tracking radar to lock onto a target. Several direct hits are needed to sink most enemy vessels.

The anti-aircraft stations on either side of the ship are crucial to the success of most missions. When enemy planes attack, they swoop and dive in squadrons, often passing directly overhead.

The animation and 3D effects are outstanding. Open fire and prepare for an even greater graphic treat. When hit, the enemy planes either explode on contact or leave a trail of smoke as they spin wildly into the ocean. These deck guns are vulnerable to attack and overheating, so make every shot count.

To attack an enemy ship at great distance, turn to the torpedo stations located on the port and starboard sides. There are five tubes per side, each equipped with a limited number of torpedoes. Fire torpedoes using the horizontal indicator, but remember to aim at your target according to its distance, speed and heading.

Four depth charge launchers, located at the ship's stern, are your only weapons against elusive submarines. By adjusting the depth setting on each rack, the barrels can be fired to surround and sink enemy subs. This phase of combat involves much trial and error. Sonar reports indicate the proximity of the sub after each blast.

Finally, the damage control station is manned by four crews ready for action. The crews are rated for speed and are automatically deployed unless manually reassigned. A diagram of the ship helps pinpoint damaged areas and indicates which repair crew is active. Novice players should keep the engines intact so, at the very least, the ship can make hasty retreat from battle.

The seven scenarios involve progressively harder combat assignments, from routine sub hunts to daring rescue attempts. Shell an enemy-held island to aid invading marines. Break an enemy blockade while protecting vulnerable supply ships. Or escort a convoy to an allied outpost deep in enemy territory. To survive the advanced missions, you must develop greater combat skills and smooth interplay between battle stations.

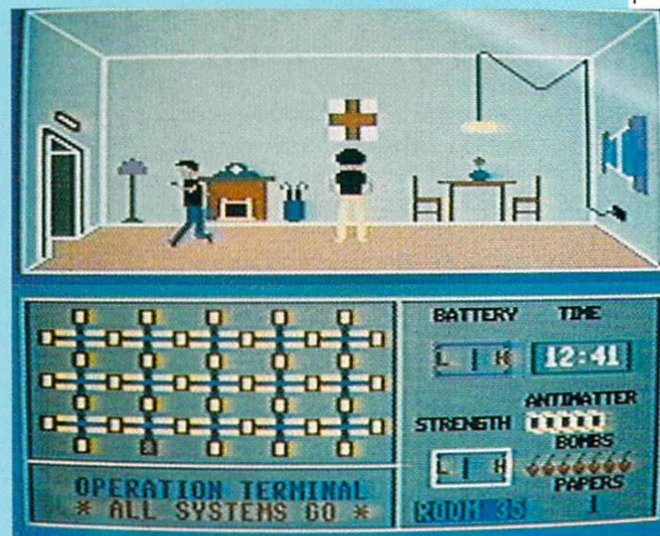
Destroyer is one of the best in a new breed of war games—a rare blend of strategy and action that works.

REVIEWED BY GARY V. FIELDS

Operation Terminal

Computer: Commodore 64
Company: Dreamrider Software
970 North Main Street
Crete, IL 60417
Medium: Disk
Price: $39.95

Operation Terminal *breathes new life into the traditional arcade game by linking players via telephone lines.*



Operation Terminal's plot is simple—you must save the world. A scientist has created a powerful energy force which can be used for good or evil. But the scientist has disappeared. To prevent the missing genius' work from falling into the wrong hands, you must retrieve the documents detailing his work. To do this, you must skydive onto an island, break into the scientist's secret laboratory, locate and open the correct wall safe, and escape before explosive devices destroy you and the valuable papers, as well as the laboratory.

The laboratory is blueprinted like a huge maze connecting 38 rooms. Each room contains a wall hanging which hides a safe. Special rooms contain machinery which you can use to help you open the safes, attend to your medical needs, as well as exit from the complex. Locating this exit is all important, since you can escape the island only through one door. To win, you must collect eight samples of antimatter, two documents, and exit before time runs out. This is a do or die situation since without the vital objects, the door will not open.

To be worth its price, a game must pass two tests: one, it must be challenging but not impossible, and two, it must be fun to play. I give *Operation Terminal* passing grades on both tests—but with clarification. When played solo (you against the computer), the game's fun and challenge qualities are limited. I think most players would quickly bore with the repetitive challenge of solo play. But the game blossums into a true challenge when played on-line with an opponent.

When you play *Operation Terminal* on-line with a friend, you are not only trying to beat the clock, but an unpredictable opponent as well. A special radar mode allows you to spy on your opponent so you can see where he is and what he's up to. However, this mode drains your life support batteries. But it will pay you back with valuable information that can help you locate vital points in the complex as well as let you know how your competition is doing.

But what I enjoyed most of on-line play was the graphic displays shared between linked computers. This is a full-color action game which displayed lifelike artistic backgrounds and character sprites all at arcade speed, even though I was using a baud rate of 300. Add to that the ability to exchange messages with your opponent and you have quite an exciting game.

Operation Terminal allows you to see not only the character you control but, providing you and your opponent are in the same room, your opponent's character as well. This means you can tail your opponent by simply locating him and going anywhere he goes. While you can't eliminate your opponent from play (no guns or fist fights allowed here), you can delay him by dropping a bomb in the room and then quickly leaving. However, bombs have a curious habit—they only explode when someone is in the room. So it is possible to drop a bomb with the intent of injuring your opponent, leave the room, wait for the explosion to do its damage, only to return too quickly and be blown up by your own handiwork. This is guaranteed to generate some laughs—from your opponent. Nothing is more embarrassing than falling into your own booby trap and then, while your character is immobilized by the explosion, have your opponent return to the room and wave at you.

Those of you who love to chat on-line can talk to your hearts content here. Any time you want to talk with your opponent you can switch to all text display by calling the other player by pressing the C key. This causes a bell to ring on both ends of the telephone line. When your opponent presses the same key, the game freezes and the game screen is replaced with a blank screen. Here you can discuss the game, the weather or whatever. When you finish you simply press the F1 key and the game resumes where you left off.

The graphics of *Operation Terminal* are well designed. The two spies are properly proportioned and look as much like real men as possible with the 64. Of course, only male characters are displayed so regardless of your gender, your on-screen character will be male.

The average on-line game lasts 30 minutes. When it ends (successfully or in a screen-shattering explosion), you can either disconnect or go directly into another game. There is no need to reload the software after each mission. However, there is no way to save a game in progress.

It seems that any time a modem is involved with software, there is a problem of getting the software and the two different computers to communicate properly. The instructions advised users to phone each other before beginning so

both users could begin loading their copy of *Operation Terminal* at the same time to facilitate getting on-line. After a few unsuccessful attempts to sign-on with my across-town friend, we both reread the directions, did exactly what the directions said, and succeeded. After selecting the proper modem offered via a screen menu, getting on-line was as simple as typing the telephone number.

The game and operation instructions are brief, taking only three pages, but complete. Dreamrider Software maintains a help line as well as a bulletin board for users who have problems with the game or who simply want to get to know the company which produced it.

If you intend to play *Operation Terminal* alone, you'll find the challenge fades quickly. But on-line play offers challenging fun worth coming back to again and again. Backup copies of the copy-protected software can be bought directly from Dreamrider Software for $10.

Tips

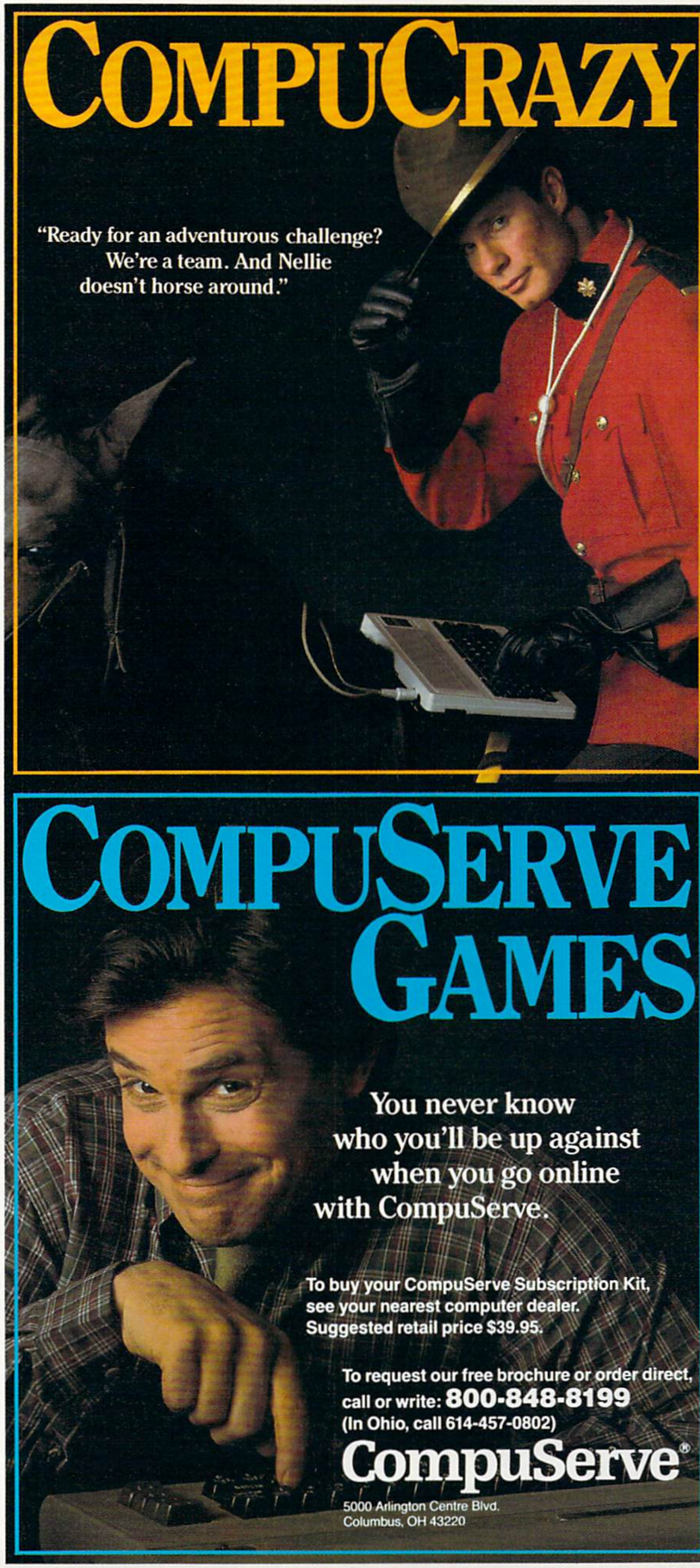
Experiment with *Operation Terminal* in solo mode before going on-line with a friend. This will maximize your playing fun since you can concentrate on the game instead of fumbling with controls. Most commands are joystick-controlled, but a few are activated from the keyboard.

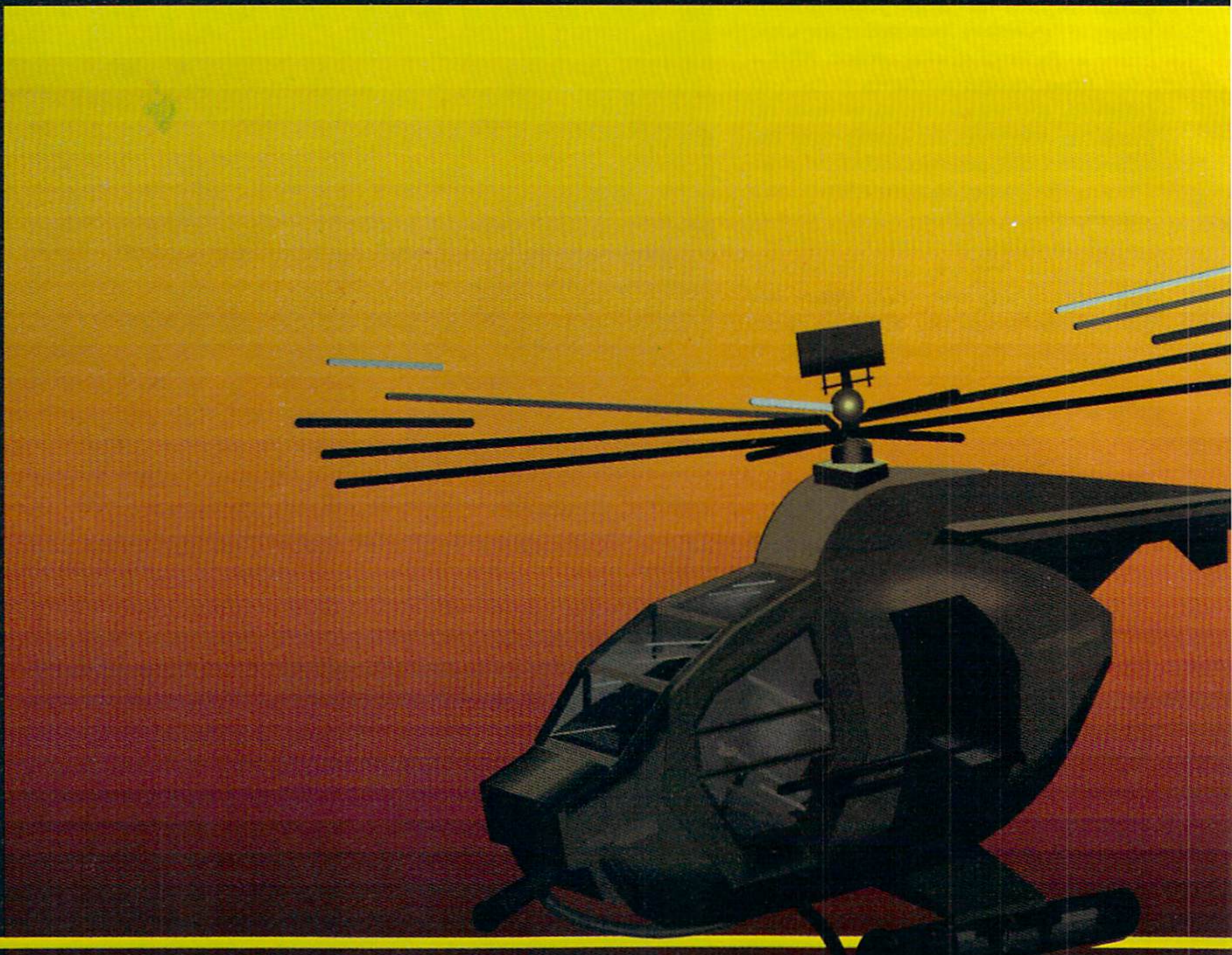
Note the location of important features in the complex like the medical room and charger room so you can return to them quickly when you need to. Also, be sure to keep track of the rooms which contain unexploded bombs—your life could depend on it.

Try to keep your batteries charged. If you do, you can activate the jamming mode before entering a new room so bombs will not explode. This is doubly important when competing with another human since they can booby trap rooms you thought were safe. The time penalty of being injured by a bomb can be more expensive than returning to the battery room to recharge.

For fun, instead of playing against your friend, team up to solve the problem. This way you can concentrate on finding the elements to win rather than splitting your efforts between hunting and bombing.

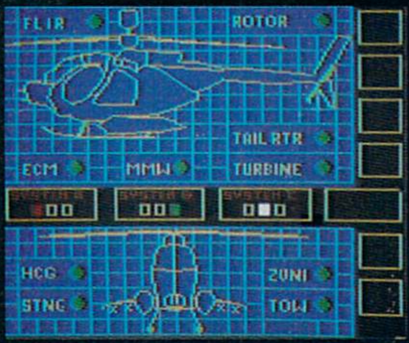
To conserve time—to think, share information or simply catch your breath—call up your opponent to talk. This freezes the game timer.





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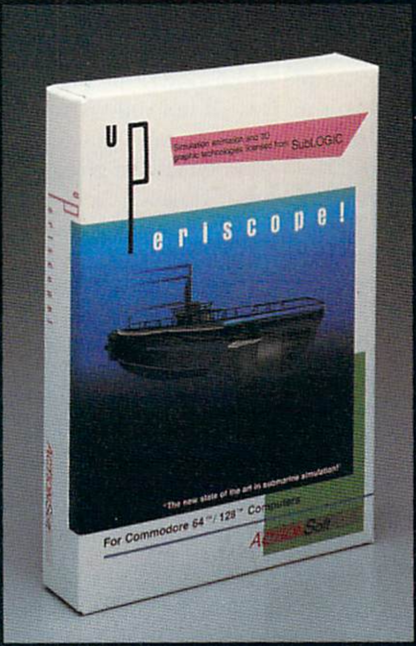


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REVIEWED BY MARK COTONE

Labyrinth: The Computer Game

Computer: Commodore 64
Publisher: Activision
2350 Bayshore Parkway
Mountain View, CA 94043
Medium: Disk
Price: $34.95

When approaching a game whose title is *Labyrinth*, one should have little trouble determining what type of challenge is in store— twisting passages, booby-trapped corridors and endless ribbons of intersecting roadways. But what is surprising is this program's host of additional elements that have been packed into this puzzle.

Based on a 1986 Jim Henson film of the same name, this contest pits you against Jareth, the notoriously evil Goblin King. In an unprovoked act of aggression, this madman has trailed and trapped you, and is presently holding you captive inside his monstrous labyrinth prison. His jury of one has just sentenced you to a life term, and it appears as if your residence will be permanent.

But with a sense of sportsmanship, Jareth has reluctantly agreed to one saving concession—if you can track down and locate him within a 13-hour time limit, an unprecedented achievement which he has deemed nothing more than an impossibility, then you will be released unharmed. But on the other hand, if time ticks away and you are still helplessly meandering around, then you will remain Jareth's eternally imprisoned property forever. With no explanation, no tools and absolutely no idea what nightmarish obstacles lay waiting on the paths ahead, the game of life and death begins.

The road to the Goblin King is a multistaged trip that moves along a long series of connected labyrinths. Each section is a puzzling little challenge in itself; a test whose solution inches you closer to your goal only by granting you access to the next portion of the contest. This underlying division technique is utilized by many maze games. It breaks the large journey down into digestible pieces, giving the player the option to progress a chunk at a time.

Labyrinth *has so many styles of mazes that from a curious explorer's point of view, you may not mind wandering aimlessly.*



But what sets this game apart from the norm is the quality and variety of each of these puzzles. Where most maze contests are like a walk down the corridor of a low budget hotel, where each door opens to reveal the same sparsely decorated, similarly constructed room, swinging back *Labyrinth*'s doors is more akin to visiting a large resort suite. Each section presents a stunning environment straining to provide a new angle.

For example, stroll down the Hall of Stone Faces and you'll not only have to decide on which path to take, but you'll also have to sift through advice given by a group of moving rock faces. Negotiating the Hedge Maze will not only take a sharp sense of direction, but a sharp pair of pruning shears as well. And the Goblin Village will have you running into one house and emerging from another, daring you to figure out the necessary escape pattern as an angry mob of violent locals march hot on your trail.

There's so many styles of mazes that from a curious explorer's point of view, you may not mind wandering aimlessly. There's just so much to see! The Wise Man's Garden is full of riddles and wrong turns, the dense Forest is scarred with numerous tree-lined trails, and the Bog of Eternal Stench presents an unstable rope bridge that will cause fits for the unsteady. There's even an all-text maze at the head of the game that helps draw the user out of the real world into the realm of *Labyrinth*'s fantasy. But if this assortment isn't enough to keep you riveted, the land is populated with strange and wonderful characters, ranging from armored guards to talking door knockers. All of these inhabitants must be tricked, fought, bought and cajoled into releasing clues and information vital to your cause.

Unlike many maze contests that use the first-person perspective, *Labyrinth* uses a variety of low-angle third-person vantages to follow the action. Your onscreen counterpart is a well defined amiable looking gal or guy (your choice) whose actions are totally joystick-controlled. A push on the stick will send you sauntering about in fully animated arm-swinging strides. To perform more elaborate tasks, like opening a door or taking an object, the joystick or keyboard is used to scroll through two on-screen lists—one containing a selection of verbs and the other a list of nouns. Pairing to-

Continued on pg. 93

REVIEWED BY BOB GUERRA

Indoor Sports

Computer: Commodore 64
Publisher: Mindscape
3444 Dundee Road
Northbrook, IL 60062
Medium: Disk
Price: $29.95

Not everyone has room for a tennis court in their back yard. In fact, if you live in a small condo or apartment, you may have a hard time just setting up a regulation size ping-pong table. But lucky for us, the folks at Mindscape have designed a ping-pong table that fits on one side of a disk. But what's more remarkable is that on the other side of the disk they've managed to squeeze a dart board, an air hockey table and a bowling alley.

If computerized ping-pong sounds vaguely familiar, it's because *Pong* was one of the first computer games ever created, and is generally accepted as a classic. However, Mindscape's ping-pong is different. Instead of a blank screen with a line down the middle, their ping-pong features a detailed three-dimensional table that can be viewed from either end or the side. The square paddles have been replaced with realistic oval paddles in your choice of colors, and *Pong*'s electronic beeps have evolved into the distinctive sound of wooden paddle against ping-pong ball.

Besides superior sound and graphics, Mindscape's ping-pong also outshines its predecessor by offering more sophisticated game play. No longer is it simply a matter of moving the paddle into the ball's path in time to return it. Now you also have the option of slamming the ball by pushing the stick forward as you make contact or placing back-spin on the ball by pulling the stick back. In addition, you can play with both paddles in the auto mode. Here, the paddles will follow the ball's path by themselves and you just have to push the fire button at the appropriate time.

While ping-pong will keep most computer gamers' hands wrapped tightly around their joysticks for quite a while, we all know that the indoor sportsman does not live by ping-pong alone. When you're ready for some real fast-paced competition, boot up the flip side and proceed directly to the air hockey table. Here you'll find a realistic rendition of the game that features a plastic disk floating at incredible speeds on a ultra-thin cushion of air. And just as on a real air hockey table, you can use your paddle to keep a close guard on your own goal or aggressively try to bank the puck at the precise angle required to slip it past your opponent. At times, the puck has a way of gliding around the table uncontrollably, however, and the game becomes as much a contest of reflexes and luck as one of skill and strategy.



The folks at Mindscape have remarkably designed a ping-pong table, a dart board, an air hockey table and a bowling alley that fit on two sides of a disk.

Again, the game is enjoyable because it looks and sounds like the real thing. As the puck slides smoothly toward the far end of the table, it gradually shrinks to give an illusion of depth. The puck makes a realistically percussive click whenever it strikes the paddles or sides of the rink, and as you play, you even hear the hiss of the air jets keeping the puck afloat.

If the action at the air hockey table gets a little too wild, you can always test your skill at a nice relaxing game of darts. Unlike the other games, success at the dart board doesn't depend as much on speed and reflexes as it does on precise timing.

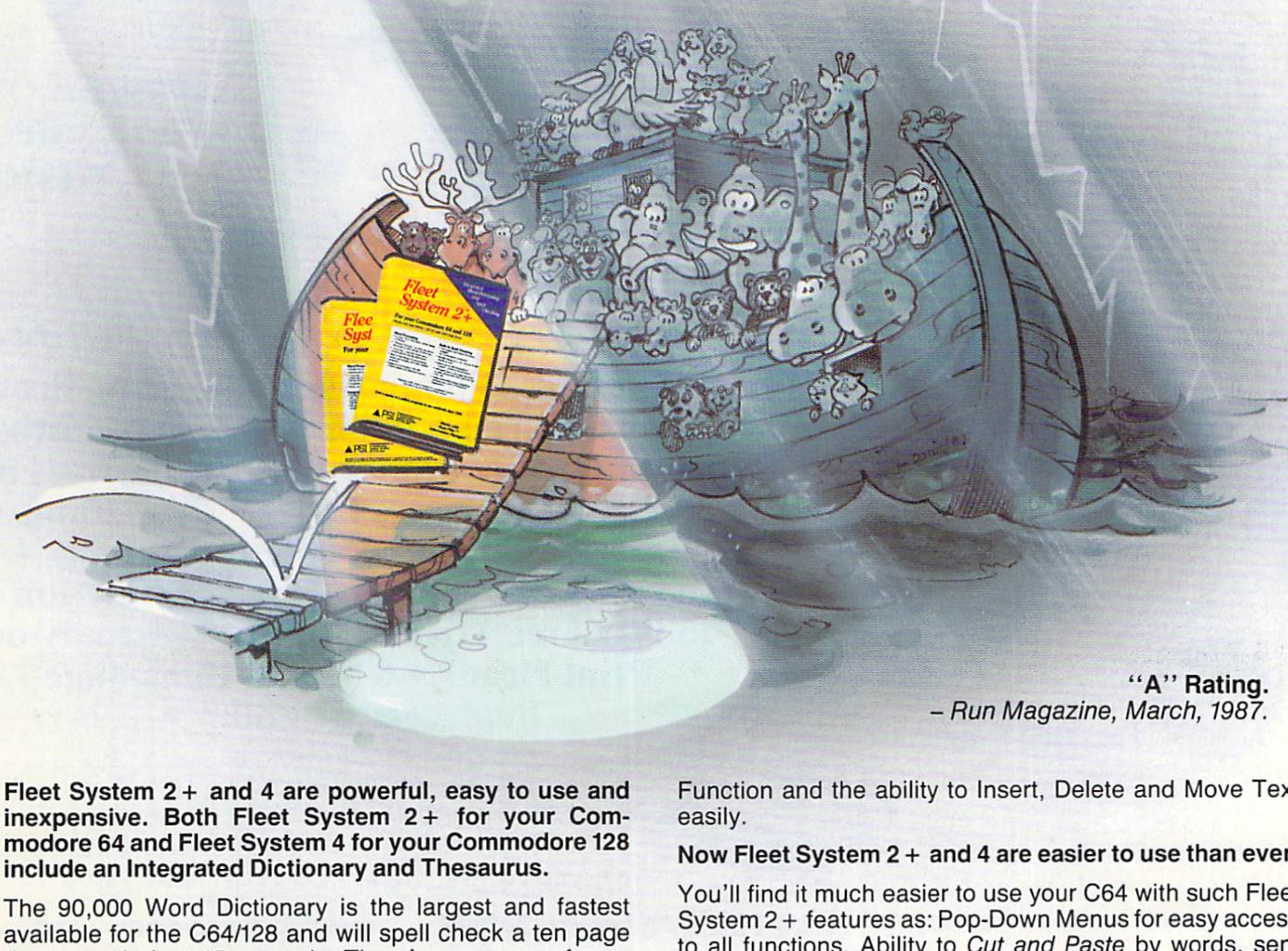
In this two-screen game, you begin at a close-up of the dart and score boards. Here you use your stick and fire button to set your aim as well as the angle and force of your throw by stopping three perpetually moving gauges at the appropriate times. When the scene quickly changes to a long shot of the dart room where you get to watch the throw. Even if you set up the shot perfectly, however, don't be too disappointed if your dart occasionally bounces out of the bull's eye and onto the floor. Other realistic details include an unlit fireplace in the dart room with a wine glass on the mantle, and a clock on the wall with a moving second hand. I grant you these things really have nothing to do with darts, but they do add a homey touch.

Real darts fans should know that your game options only include 301, 501 and 701. For other popular games such as Cricket, you'll just have to head down to your favorite pub.

Similarly, real bowlers will probably want to head down to the nearest alley to roll a few strings rather than trying to master the mechanics of the *Indoor Sports*'s bowling simulation. Unfortunately, in an effort to give you a great deal of control over direction and curve of the ball, the game's designers have come up with a system of control that's awkward and difficult, if not impossible, to master. Even if the control system were better, the game suffers from cartoon-like graphics and animation, as well as unrealistic sound.

All of the *Indoor Sports* games can be played solo against the computer or head-to-head against a joystick-wielding competitor. In addition, each game features several options allowing you to customize such parameters as the computer's skill level and overall game speed. These selections are easily made by moving a joystick-controlled arrow to the desired choice on an on-screen menu and pressing the fire button. Even without a good bowling simulation, *Indoor Sports*'s superb graphic and sound effects combined with the great variety of play options makes it an excellent choice for all indoor sports enthusiasts.

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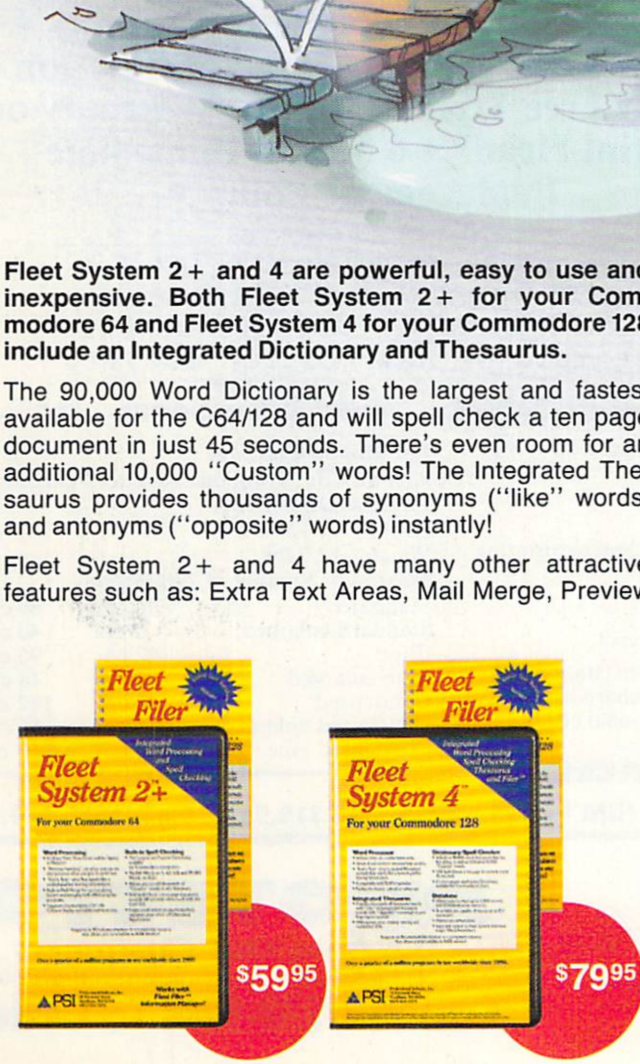


"A" Rating.
– Run Magazine, March, 1987.

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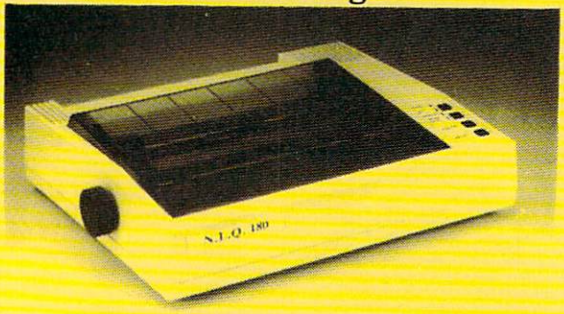
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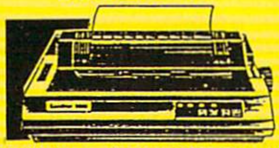
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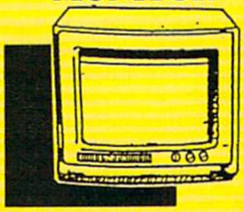
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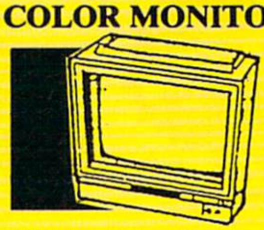
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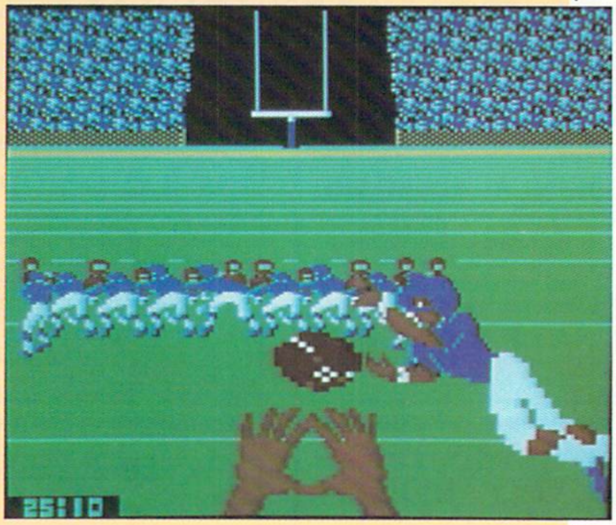
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REVIEWED BY MARK COTONE

GFL Championship Football

Computer: Commodore 64
Publisher: Gamestar/Activision
2350 Bayshore Parkway
Mountain View, CA 94043
Medium: Disk
Price: $34.99

Not only does this program inject some novel elements into a field of relative clones, but it does so without disrupting any of the sacred underlying principles of a fairly complex sport.



GFL Championship Football moves you off the bench and onto the field, trading in the popular wide angle spectator's perspective for a first-person point of view. Your eyes become those of the offensive back shooting through the line, the wide receiver reaching for a pass, and the punter booting a high spiral from the pressure of his own end zone. You're the center of attention—the target for all defensive marauders. It accentuates the difference between being at a game or being in it.

Before taking the field, there is a short pre-game chalkboard session where coaches get a chance to lay out the parameters of the ensuing struggle. This includes selecting a one- or two-player contest, determining how long each of the quarters will run, and drafting a team for ownership. Twenty-eight different squads are available to choose from, each styled after a current NFL club. Although fictitious names are used, with teams like the Grizzlys and the Miners, it isn't hard to guess who represents who.

Each team has been scouted and ranked in eight specific skill categories, ranging from quarterback to linebacker to coach. This breakdown allows the player/owner to study the strengths and weaknesses of each club, enabling him to choose a crew that will best fit his game plan. Also, since all teams are not created equal, the selection of a weaker squad is an effective way of handicapping the more experienced user when he's up against a newcomer to the game. When both coaches have decided upon an affiliate, it's kickoff time.

On offense, running a play is a two-staged affair. First comes the huddle, where a quarterback scrolls through a list of 37 different plays, choosing the formation and mode of attack. The scene then shifts to the line of scrimmage, where depending on what type of play has been called, the action is viewed through the eyes of either the wide receiver or the tail back.

On running plays, your joystick-controlled player is positioned a few steps behind the quarterback, staring out over the offensive line into the faces of the hungry defenders. Signals are barked, the ball is snapped, and the quarterback turns for the pitch or hand off. Suddenly, everyone goes into motion. As the sole running back, it's your job to take the ball and dash up field, blasting your way through the hole that your teammates have opened. The field pans back and forth as your player attempts to maneuver around a gang of aggressive tacklers and break for daylight. But more often than not, a couple of vicious licks will cut the run short before it can gain any momentum.

On passing plays you step into the role of wide receiver, flanking your lineman on the right or left. A menacing defender or two stand a couple of yards down field, anticipating your sprint from the line. At the snap of the ball you move your man through his assigned pass route, with the rival defenders shadowing with quick backpedalling strides. Back at the line of scrimmage, the quarterback cocks his arm and rifles the ball into flight, throwing it to the field position where the receiver is suppose to cut across. Only an exacting well timed pattern will result in a completed pass.

One extra or forgotten step and the ball will sail by untouched. And even if your receiver and quarterback are in sync, it's no guarantee for success. If the defense can guess the play and supply the correct coverage, chances are that the ball will be either batted away or intercepted.

Since the play field is always seen through the eyes of the offensive player, the role of the defending team is rather restricted. After choosing a play from his own list of 13 selections, the defensive coordinator then becomes spectator, sitting back to watch as the computer makes sure that all his players are following their assignments. This setup works well enough, but it puts some added pressure on the defense. A bad play selection on this side cannot be covered with some quick joystick maneuvering. If the play begins and you're caught with the wrong defensive alignment, you'll pay the price in yardage.

Even with all of *GFL Championship Football*'s unique features, Gamestar still realizes that football is football. Users will appreciate the designers' attempt to keep all the details of the traditional game intact. A colorful scoreboard keeps track of

Continued on pg. 119

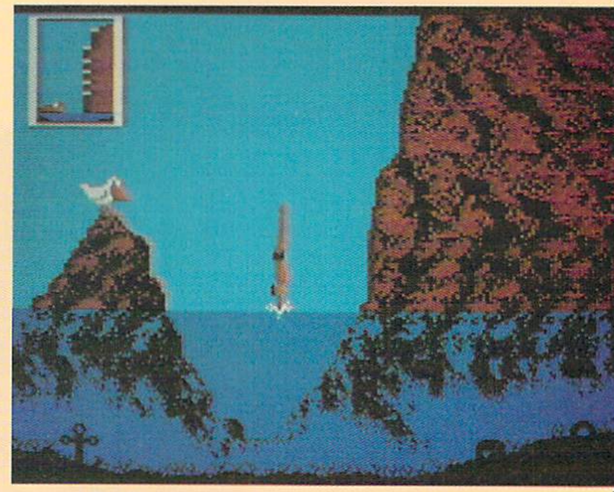


REVIEWED BY MARK COTONE

World Games

Computer: Commodore 64
Publisher: Epyx
600 Galveston Drive
Redwood City, CA 94063
Medium: Disk
Price: Not available for publication

World Games takes users on the road, traveling along an eight-stage global sports tour that stops for some of the world's most unusual athletic events.



In *World Games*, Epyx takes the formula that made their *Winter Games* and *Summer Games* such a success and adapts it to a whole new sphere of sporting events. Instead of the usual Olympic tradition in which all the world's countries carry on their competitive celebration by gathering together at a single location, this program takes users on the road, traveling along an eight-stage global sports tour that stops for some of the world's most unusual athletic events. Pack up your joystick, limber your trigger finger, and ready yourself for a trip through a full variety of international challenges. From the timber-lined lumberjack camps of Canada to the clay-surfaced wrestling rings of Japan, the games are about to begin.

As with most computer sports simulations, the test of athletic prowess is translated into a test of joystick manipulation. How well you can jiggle and tap your controller will determine the success of your on-screen contestant. *World Games* essentially measures three gaming skills: reflexes, timing and pacing.

Reflexes are of utmost importance. From the American West we have the dangerous rodeo sport of bull riding. Choosing from an assortment of progressively wilder bareback bulls, the idea is to keep your cowboy atop his mount by constantly changing his riding position to counter the spinning, bucking moves of the bull. Spend a few seconds on Earthquake, the toughest of the lot, and you'll fully understand saddle sores.

From Chamonix, France, the site of the first Winter Olympics, comes slalom skiing, a race against time and ice. Here you must zig-zag your way down a treacherous course outlined by a series of flagged gates intent on knocking you for a snow facial. Quick hands are needed in both these trials to post competitive scores.

Next, *World Games* offers a trio of contests set to test your sense of athletic timing. From the famed shores of sunny Acapulco comes cliff diving, where daredevil divers launch themselves from any of five dizzying heights into the perils of the rock-pitted surf below. Varying winds and quickly changing wave-regulated water depths must be taken into account on each of the three allotted attempts or the results are sure to be painful.

For the more muscle conscious, Russia offers weightlifting, with both the Snatch and the Clean-and-Jerk events on the Iron Game agenda. With the brawn element obviously eliminated, this contest becomes a solid timing challenge. Unless you can perform the various transitionary stages of the lift with fluent movement, you'll never even get the bar past your ankles.

The final stop on this leg of the journey is Japan, where any well-rounded athlete may try his luck at sumo wrestling. Playing against either a human or computer opponent, each grappler uses a series of 12 different moves to try to force the opposition onto the ground or out of the ring. The winner will be the one who is able to use his opponent's weight to his advantage—knowing the precise moment to turn a harmless push into a strategic pull to send a quarter ton of sumo sailing to defeat.

The three remaining games test rhythmic ability. In Germany, contestants zip across a frozen lake to compete in the 300 year-old sport of barrel jumping. Players move their joystick shaft back and forth to pace their skaters' legs, building the speed needed to clear a chosen number of barrels. If a tempo is established and increased smoothly, the skater will glide forward without fault. But if your rhythm is irregular or broken, the skater's stride will be inconsistent and slow, with a crash landing an all but certain conclusion.

This same type of controller movement is required in the caber toss, Scotland's claim to sporting fame, where participants see how far they can hurl and flip the caber, an awkward telephone pole-size wooden post. With the end of this implement held in one's arm, a left/right joystick tempo is used to build the forward momentum needed for a successful toss. Miss a step and your athlete will be unbalanced, making for a difficult if not embarrassing throw.

The final stop is Canada, where a pair of lumberjacks try to prove their balance and agility in a round of log rolling. Perched in a frigid lake upon the trunk of a fallen tree, the contestants use their feet to spin the log, attempting to send their opponent in for a humbling bath. Once again, the key is in the pacing of your stride. On this slick surface, your first wrong step will be your last.

The atmosphere Epyx presents in each

Continued on pg. 113

REVIEWED BY GARY V. FIELDS

Balance of Power

Computer: Amiga (256K)
Publisher: Mindscape
3444 Dundee Road
Northbrook, IL 60062
Medium: Disk/Book
Price: $49.95 (Disk)
$10.95 (Book)

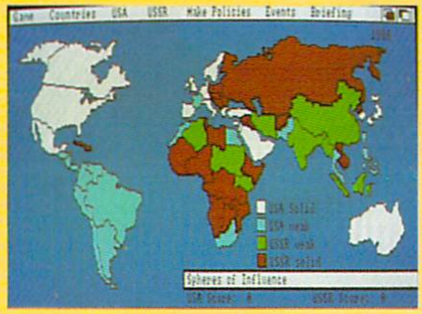
Balance of Power does not fit the mold of traditional computer games. Instead, it is a serious simulation of geopolitics. The package is perfect for those who have dreamed of welding the powers of the President of the United States or General Secretary of the U.S.S.R. as you dictate foreign policy. This simulation uses the power of the Amiga to recreate, in minute detail, the global political situation as it exists today. Each player's goal is to enhance their country's prestige while avoiding a military conflict.

To call *Balance of Power* a game would denude the word of its meaning. Games are usually thought of in terms of fun, amusement or play. None of these words describe this simulation. To approach the subject matter of this type in anything other than a serious frame of mind is tantamount to defeat. And to attempt to play without studying the 87-page manual is to concede defeat before you begin.

To compete at all is to force yourself to face the raw and dangerous facts of life in the 1980's. But you may discover that you find international politics more interesting and easier to understand after a few rounds with *Balance of Power.* Regardless, be prepared to face some tough problems, difficult decisions, and more than a few no-win choices while exploring this simulation.

Here the importance of the internal makeup and political stability of small, third-world countries in relationship to the security and stability of the global community quickly surface. The entire world is the playing field here and the internal strife, political alliances and financial stability of each country affects the security of its neighbors as well as other countries around the globe.

To win at *Balance of Power* you must enhance your country's prestige while preventing your opponent from increasing his. After experiencing the penalties of poorly executed brinkmanship a few times, I must confess that I was content just to end my term as head of state with the world still in one piece. Prestige is gained when other countries like or respect you. The greater the military strength of the countries who admire your country, the greater the prestige you can receive from them. Thus, you want to stay friendly with powerful countries and have only weak countries as enemies. This political battle is fought on a finely detailed displayed world map.



I must confess that I was content just to end my term as head of state with the world still in one piece.

The mouse is used to activate menu windows which reveal the program's options: Game, Countries, USA, USSR, Make Policies, Events and Briefing. Placing the pointer to a country on the map and clicking the mouse causes the name of the country to appear. A graph on the screen uses colors to illustrate the stability of the country—white means the government is stable, red signifies revolt.

At the beginning of the game, three countries are experiencing revolutions: Mali, Zaire, and Burma. As the years pass, your decisions will partially cause these countries to either achieve peace or be torn by dissension.

The Countries menu lets you view critical political and military facts pertaining to all the countries of the world. The next two menus, USA and USSR, reflect the diplomatic relationship of the global community. A quick click of the mouse shows which countries are hostile, cool, cordial or warm toward the country you are controlling. You can also examine how much military aid you or your opponent supplies each country as well as in which countries your own land troops are involved.

The game's interface prevents users from becoming bogged down trying to master the game. I was pleased the controls made it easy to keep informed of and on top of world conditions, even deep into the game.

The guts of the simulation are in the final three menus. The Make Policies menu lets you send military aid to countries, intervent militarily on either the government's or rebel's behalf, sign treaties, attempt to destabilize the government or pressure them into doing your will.

But the real challenge to world peace is found when the Events menu is selected. Here you must face and cope with crises which parallel true world events. For instance, what should you do if the CIA tells you the Soviet government is rushing massive military power to help the Vietnamese government? If you challenge that action, the Soviets could either back down or insist you back down. If both sides refuse to retreat, then a world crisis may develop. If the crisis is not defused, the two super powers may lock arms in a winnerless war.

But if you back down, your prestige may be tarnished. If you can force the other side to back down, you will gain prestige. The menu also delivers news items involving the lesser nations which may or may not have any bearing on your decisions or prestige.

The last menu called Briefing opens up a new series of information options which add to your understanding of the countries you must co-exist with; things like the selected country's population, Gross National Productivity, size of military, literacy ranking and per capita calorie intake. You can also find out how many televisions, telephones and doctors each country has, not to mention their civil and political rights ranking when compared with the rest of the world.

This huge bank of information is immediately available. There are few waits for the disk to access the details or pauses while the computer adds or subtracts numbers. In short, the actual ac-

Continued on pg. 109

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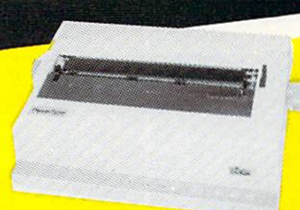
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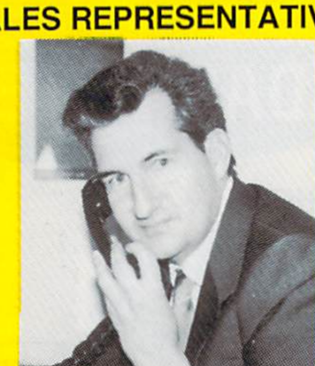
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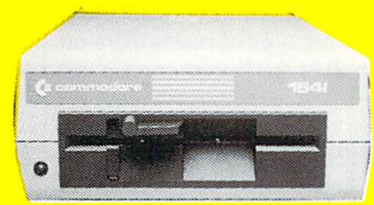


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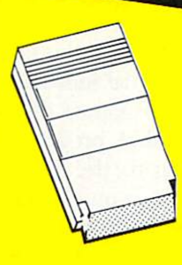
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REVIEWED BY BRUCE JAEGER

Buyer's Guide to 128 BASIC Compilers

The four BASIC compilers for the Commodore 128 reviewed here will all make your programs run much faster, and some will even give you a little more BASIC programming power than the 128's standard BASIC 7.0.

It seems that programmers are never satisfied. We always want more powerful commands, higher-resolution graphics, and much more speed. Unfortunately, programs written in BASIC on the Commodore 128 seem to run too slowly, in part because of all the extra programming power of BASIC 7.0. The larger the list of commands that the BASIC interpreter has to handle, the slower it runs.

Why does a standard BASIC program seem to run so slowly? It's not that the BASIC interpreter is slow; it's just that it has so much to do. Every time you run a program, the BASIC interpreter has to compile your program line-by-line, converting all of your BASIC instructions into machine code that it can understand. First, the interpreter must go to the beginning of your program, find the line it's supposed to be executing, convert the first command in the line to machine code, search around in a list of variables for any referred to in that command (starting from the start of the variable list each time), convert all numbers to floating point, and then (finally) call the necessary machine-language routine(s) in the BASIC ROM for that command. The process then continues for the next command in the program line . . . Whew! No wonder BASIC seems to creep!

One thing that helps is to compile your BASIC program. The four BASIC compilers for the Commodore 128 reviewed here will all make your programs run much faster, and some will even give you a little more BASIC programming power than the 128's standard BASIC 7.0.

When you compile a program using a BASIC compiler like *Basic 128, Blitz!, Gnome Speed* or *PetSpeed*, the compiler goes through your BASIC text and does all the time-consuming interpreting and decoding all at once before you run the program. A separate address in memory is assigned to all variables, and this actual address is plugged into each program line when a variable is accessed. Also, any numerical constants are converted to a machine-readable format, all GOTOs and GOSUBs are converted to actual addresses in memory, and a lot of other predigesting of your BASIC program takes place. Thus, when the compiled version of the program is run, no time-consuming conversions or variable look-ups have to be performed, and the program will run up to 30 times faster.

The actual increase in speed depends upon the nature of the program being compiled. A program that does a lot of printing to the screen won't seem to speed up as much as a program that does a lot of mathematical calculations, as the compiler can't do anything to speed up a computer's ROM screenprint routine.

The use of the term compiler here is somewhat of a misnomer, as these products don't really compile your BASIC program into actual machine language. (Abacus Software's *BASIC 128* compiler is the only one of the four that offers the option of actual machine-code compilation. More on this later.) Instead, the compilers produce what is called P-Code, Pseudo-Code or Speed Code, a disk file which is little more than your BASIC program with all of the above conversions and interpreting already done.

The 128's built-in BASIC interpreter wouldn't know what to do with this stripped-down P-Code, however. Another machine-language program, called a run-time module, is necessary to run a compiled program. This module acts as a kind of interface between the BASIC interpreter and the instructions of the compiled program, looking up variables and calling BASIC routines in ROM as necessary.

Programmers familiar with Commodore 64 compilers will notice a major difference in compilers written for the 128. BASIC 7.0 offers the new command RESUME NEXT, which might be used at the end of a subroutine called by COLLISION or TRAP. The problem with RESUME NEXT (as opposed to the easily compiled RESUME 1000, for example) is that it doesn't cause a jump to any specific program line. For RESUME NEXT to work in a compiled program, some sort of line number record must be kept by the compiler. Only *BASIC 128* and *Gnome Speed* support RESUME NEXT, although execution speed and program length both suffer because of the extra code involved.

All of the compilers support some form of program chaining or overlaying, so that variables may be shared when your main program loads different programs from the disk. The larger memory of the 128, of course, means that you're less likely to have to break your program up into separate chunks like with the 64.

Each compiler allows the programmer to turn on or off different types of compiler options by the use of imbedded directives. These are special codes that you insert after a REM statement in your BASIC program. For example, to convert the variables X, Y and Z to integer variables with the *Blitz!* compiler, you would include the line REM ** FI X,Y,Z somewhere near the beginning of your program (as opposed to interpreted BASIC, a compiled program will work much faster with integer variables than with the usual floating-point variables). When the program is run normally, the BASIC interpreter will still ignore the special REM statements, but when the program is compiled the compiler will see them as instructions for itself.

I've used two short benchmark programs here to test the speed of the compilers. The results of running these programs are included in the comparison chart. Also included in the chart is the actual time each compiler took to compile a normal 79-block BASIC program and a large variable and DATA packed 175-block program. The actual compile time of a compiler is sometimes

just as important to a busy programmer as the speed of the resulting program.

BASIC 128
(Abacus Software)

BASIC 128 is unquestionably the most powerful compiler of the four. It compiles the fastest-executing code (depending upon the optimization level chosen, and programs compiled under it have more space for variable storage than any of the other compilers tested, because *BASIC 128* uses memory in BANK 0 not used by the program itself for simple and subscripted variables, as well as the entire BANK 1.

The Abacus compiler is also the only one to offer a machine-code option, in which the output of the compiler is not the usual P-Code but more like true 6502 machine code. A program compiled with the machine-code option will run considerably faster, but will also require more memory, which might preclude *BASIC 128*'s use in longer programs. *BASIC 128* will, however, let you compile parts of your program into P-Code and parts of your program into machine code by using the special REM statement compiler directives. Thus, you can compile the bulk of your program in space-saving P-Code and compile just your speed-intensive subroutines in machine code. No other BASIC compiler for the 128 offers this feature.

Abacus has recently added a much-needed index to their 84-page manual, which is the best of the bunch as far as the amount of information included. (The *BASIC 128* manual is enclosed in a three-ring binder along with a holder for the program disk. The other three compilers come with stapled instruction booklets.) There are some places in the manual where I wish the examples of proper command usage were a little more clear, and the example Quicksort program doesn't work well, but all in all I was always able to find what I needed.

BASIC 128 is the only compiler tested here that uses the traditional non-standard disk form of copy protection. And while you really can't fault Abacus for using copy protection, the form used with *BASIC 128* means that you can't conveniently have the compiler on the same disk as your source program, which makes it necessary to repeatedly swap disks during program development and testing.

There's another thing that makes program development more trying with the Abacus compiler: programs erase themselves upon completion! You can't run them again without re-loading.

A compiled program using the BASIC statement SPRSAV (and maybe some other commands or functions) won't work with string array variables in the version of *BASIC 128* I tested, giving a TYPE MISMATCH ERROR on compilation. This bug isn't documented in the manual, and I only found out the solution by trial and error. You have to employ an intermediate simple string.

```
REPLACE:  100 SPRSAV X$(N),1
WITH:     100 A$ = X$(N):
          SPRSAV 1,A$
```

I can think of no explanation for it, but several programs I've compiled with *BASIC 128* seem to occasionally exhibit the famous Commodore 64 garbage-collection delays (when the computer seems to freeze up while it rearranges its memory). I've noticed these second-long delays while running compiled *BASIC 128* programs that performed a lot of string manipulations, particularly in an input routine that uses repeated GET statements. None of the other compilers tested exhibited this problem.

All in all, Abacus Software's *BASIC 128* is an excellent compiler for the Commodore 128, with features and performance unmatched by the competition.

NICE FEATURES:
- Fastest-executing code (when optimized)
- Program beeps when finished compiling
- Allows disk commands from compiler menu
- Optional P-Code or Machine-Code
- Replaces slow ROM routine for TAN, ATN, SIN, COS, SQR, EXP and LOG with its own faster code
- Handles BASIC relative graphic commands Handles BASIC extensions

SHORTCOMINGS:
- Single drive only
- No printer support
- Compiled programs NEW themselves when finished
- Copy protection method necessitates disk swapping

Blitz! 128
(Skyles Electric Works)

Blitz! 128 must have been written with the weary programmer in mind. It is the fastest compiler tested, at least in terms of the time you have to wait for the compiler to do its work. The use of a parallel-port dongle (an electronic circuit that plugs into the parallel port and tells *Blitz!* that you are a legitimate user of the compiler) allows you to copy the compiler program onto your sourcecode disk, eliminating lots of disk swapping as you develop a program. And only *Blitz!* supports two disk drives.

Blitz!-compiled programs execute many times faster than their BASIC counterparts, but aren't quite up there in the *BASIC 128* or *PetSpeed* speed range. Whether or not this is significant depends upon your application.

While *Blitz!* supports the use of two disk drives, it does so only as a convenience to the programmer, and fails to take advantage of possible reductions in compilation time. All the compilers tested create several temporary disk files as they compile a program. As the final compiled program code is being written to disk, the compiler is also reading these temporary files, causing the disk drive's read/write head to constantly move back and forth between files. If these temporary files were on a separate disk drive from the final object code, the time to compile a program could be dramatically reduced. (I've noticed this while compiling programs on the Commodore 64 using the *InstaSpeed* compiler in both single and dual drive modes.) Unfortunately, *Blitz!* puts the temporary files and the finished code on the same disk (even in two-disk mode), giving exactly the same compile times as when using a single drive. While this may all seem like too much nit-picking, I've seen lots of programmers with deadlines approaching twiddling their thumbs while waiting for the compiler to spit out the latest version of their programs.

Still, *Blitz! 128* is a good workable compiler, and the fastest one to get your BASIC programs compiled.

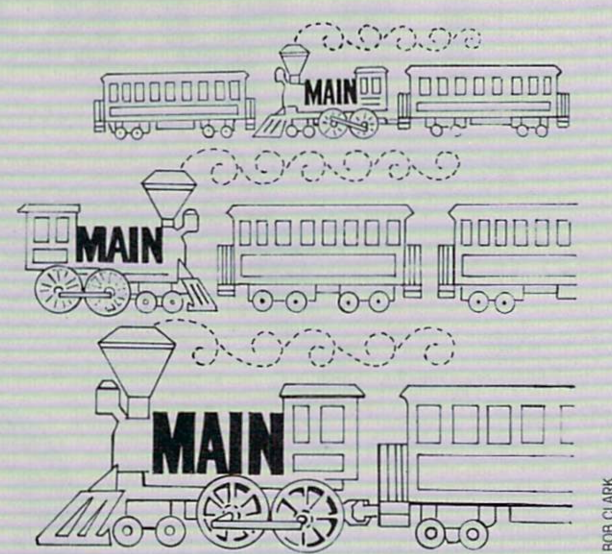
NICE FEATURES:
- Only compiler to allow the compilation of several programs on a disk without further user intervention
- Fastest compiling time of all four tested
- Offers four languages (English, German, French, and Italian)
- Compiler beeps when program is compiled
- Handles BASIC extensions

Continued on pg. 111

BY PAUL HIGGINBOTTOM

C Tutorial, Part 3

Get to know the C language in this series by programmer Paul Higginbottom.



At the end of the last article, there was a skeleton program for you to complete. Naturally, my "solution" below is not definitive. As you are no doubt aware, there is always more than one way to write a program.

```
main ()
{
      int nums[10];
      int i;
      int max;
.
.
```

(Here the nums array gets filled with values, but you needn't worry about this)

```
.
.
max = 0;
for (i = 0; i <10; + +i) {
   if (nums[i] > max) {
      max = nums[i];
   }
}
printf("%d\n", max);
}
```

The above solution should be fairly straightforward. It uses two variables: "max" to keep track of the maximum value found in the array and "i" as a subscript into the nums array.

More on Functions

I mentioned in the first article that C is a functional language, meaning that programs are comprised of one or more functions which are "called" by each other. The C programs you have seen thus far have been comprised of just one function: main( ). Main( ) is a special function, because it is always required in every complete program, as it is the place where the program begins. It does not have to be the first function in order, but it must exist somewhere. Main( ) often becomes just an entry and exit point for a program, looking something like:

```
main()
{
   init(); /* do all the initialization */
   doit(); /* do the whole program */
   cleanup(); /* make sure all is complete before we exit */
}
```

and somewhere else the three functions called in main( ) are defined.

By breaking a program up into functions (with hopefully meaningful names), the program is easier to maintain and improve because generally, once a function is written (if its purpose was clearly thought through before writing), it often never needs to be changed, unless something fundamental about a program changes.

Additionally, writing general purpose functions serves as an excellent source of reference for the future. I have hundreds of functions written which I use over and over in different programs, saving me an enormous amount of time because I don't have to keep re-inventing the wheel, so to speak.

```
   int i;
   int max;
   max = 0;
   for (i = 0; i < = 10; + + 1) {
      if (nums[i] > max) {
         /* if we have a new maximum number . . . */
         max = nums[i];     /* remember it */
      }
   }
   /*
      The return statement returns a value to whatever function
      called this.
   */
   return(max);
}
main ()
{
   int nums[10];
   /*
      initialize the 10 values this time . . .
   */
```

```
    nums[0] = 1;
    nums[1] = 5;
    nums[2] = 6;
    nums[3] = 4;
    nums[4] = 12;
    nums[5] = 0;
    nums[6] = 3;
    nums[7] = 2;
    nums[8] = 9;
    nums[9] = 8;
    printf ("The maximum value is %d\n", max (nums) );
}
```

I also mentioned in the first article that functions are like programs unto themselves, often with their own variables. Variables defined within a function are local to that function. In other words, if a function fred( ) has a variable "i" in it, that is not the same as a variable named "i" in another function called joe( ), for example. This is another reason why functions can be so portable between programs, because there is no need to worry about a conflict in naming variables. A variable "i" (or indeed any variables) can be declared, however, so that a reference to them from anywhere does mean that one instance of that variable. These are known as global variables (as opposed to local) and the global variables can be created by not declaring them inside any function. For example:

```
int Counter; /* this variable gets used everywhere */

main ()
{
    /* I can use Counter in here */
    ...
}
a_function()
{
    /* so can I!! */
    ...
}
```

One last thing about functions. Because they are called functions and not procedures, they can (optionally) return a value. That is, the function itself can have value, and can be used just like a variable or constant in any expression.

So to show the above points, let's rewrite the skeleton with a function to determine, and return, the maximum value.

```
/*
    max( ) is passed the name of an array of 10 integer values, and
    returns the largest.
*/
int max (nums)
int nums[ ];
{
```

Note: the function max( ) is passed the name of the array, not the whole array itself. What the name of the array actually is, that is, what is actually passed, is the address of the start of the array in the computer's memory. The parameter is defined just under the declaration of the function max( ) as:

```
int nums[ ];
```

The lack of any size between [ ] is exactly because the whole array is not passed, just the address of the start of the array. The [ ] is necessary though to indicate max( ) is being passed the address of an array of integers, and not just an integer (which would be the case if the [ ] were not present). The idea of passing addresses and using the addresses of variables will be covered in massive detail later on, but for the sake of keeping things simple, it will not be explained here.

Loops

C provides three types of loops which are all fairly similar. Their skeleton formats are:

```
1. for (<1>; <2>; <3>) {
        <whatever you like>
   }
2. while (<2>) {
        <whatever you like>
   }
and
3. do {
        <whatever you like>
   } while (<2>);
```

The numbers shown between < and > and < and > themselves would not be entered literally; they represent the following:

<1> (Optional) initialization statement(s). If there is none, the semicolon must still be present to separate the lack of initialization statements from the condition expression (<2>).

<2> (Optional) condition which must be true in order for contents of loop to be executed. If you don't have a condition (just a semicolon by itself again) the loop will execute forever unless you provide a means of escape by one of:

i) The "goto" statement. Example:

```
<some loop> {
    goto mylabel;
    .
    .
}
.
.
mylabel: /* note, a label is followed by a colon */
```

ii) The "break" statement, which simply terminates the loop immediately.

<3> (Optional) statement(s) to be executed if <2> is true after the contents of the loop have been executed. If no statements are to be executed, nothing is required (not even a semicolon) because there is nothing else in the specification of the loop.

Example of the FOR Loop

```
for (count = 0; count < 4; ++count) {
    printf("%d\n", count);
}
```

The above fragment of code does the following:

1) Initializes the variable count to 0 (step <1>).
2) For the contents of the loop to execute, "count" must be less than 4 (step <2>).
3) After each time through the loop, and if condition <2> is still satisfied, the variable "count" is incremented.

From the above description, you should be able to see that the output of that fragment would be:

0
1
2
3

Example of WHILE Loop

```
while (fred != 6) {
    printf("%d\n", fred);
    ++fred;
}
```

In English, this loop could be written as:

WHILE fred does not equal 6, print out its value, and increment it.

Note that a WHILE loop is the same as a FOR loop without steps <1> and <3>, and often you will find it highly debatable as to which type of loop you should use. One thing to look for (and avoid) is code where you initialize variables, and then enter a WHILE loop. Use a FOR loop instead, since it provides initialization statements.

Example of DO Loop

```
do {
    printf("%d\n", fred);
    ++fred;
} while (fred != 6);
```

In English, this loop could be written as:

Print out the value of fred WHILE fred does not equal 6.

Note the difference between the WHILE and the DO loop is that the latter guarantees at least one time through the loop. In programs, it is often desirable to have loops that DO something at least once or only WHILE something is true (maybe not at all).

Conditions

A condition (represented by part <2> above) is simply an expression. It is true if it evaluates to anything but zero. It is false if and only if its value is zero.

In the example above, you can see that the test for not equal to is represented by an exclamation symbol and an equals symbol (without spaces). That is one of the two equality operators. To summarize them:

a != b If expression "a" is not equal to expression "b" the whole expression is TRUE.

a == b If expression "a" is equal to expression "b" the whole expression is TRUE.

NOTE: there are TWO equals signs . . . a common mistake is leaving one out, for example:

```
if (a = b) {
    ...
}
```

What the above does is put the value of b into a. If that value is non-zero, the statements inside the braces will be executed. This is usually not what one wants to do.

There are relational operators which test the relation between two expressions.

a > b Test if "a" greater than "b".
a >= b Test if "a" greater than or equal to "b".
a < b Test if "a" less than "b".
a <= b Test if "a" less than or equal to "b".

One more odd one is the negation operator, represented by a single exclamation sign. This unary (single operand) operator says:

If the value is zero, make it one.
Else, make it zero.

It is useful for testing if something is zero.

```
if (!flag) {
/* do things if the flag is zero */
}
```

This is an alternative then, to

```
if (flag == 0) {
    /* do things if the flag is zero */
}
```

It is arguable which is better—the choice usually depends on the context, and which format will make the test clearer.

Last, but certainly not least, are the logical operators (not the ones used as arithmetic operators, these are for associating tests).

a && b TRUE if expressions "a" AND "b" are both true.
a :: b TRUE if expressions "a" OR "b" are true.

Now that you are aware of one kind of testing, three types of loops, functions that return values, write a program that has two functions, main() and power(). Power() will take two integer arguments and will return the first number raised to the power of the second integer. The overall purpose of the program will be to display the values 1 to 10 down the screen, raised to the powers 2 through 5 going across the screen. In other words,

1	1	1	1	1
2	4	8	16	32
3	9	27	81	243
4	(etc.)			

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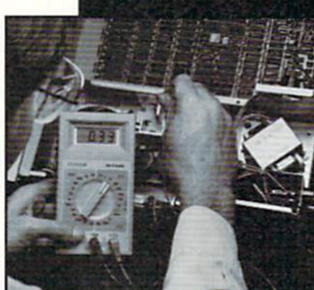
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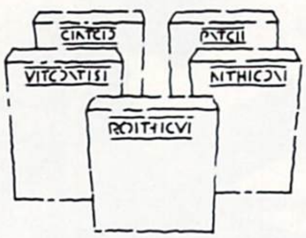
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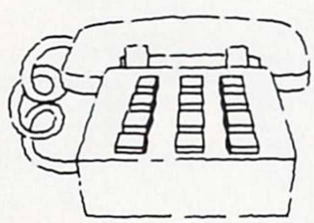
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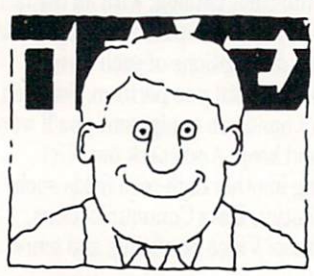
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BY SUZANNE McCOACH AND DAN SCHEIN

Connect!

A Guide to Telecommunications Literacy

Become an on-line expert in this ongoing telecommunmications tutorial.



In the past four articles, we have explained the terms you will come across in telecommunications. We have detailed the items you need to telecommunicate, how to connect your Commodore modem to your computer, and some of the many services you can access. In this installment, we cover dialing your modem, logging on, and how to do a file transfer (upload/download).

The first thing you need to do after all your equipment is connected is load your telecommunications (terminal) software. For this article, we are using the *Common Sense* terminal program. *Common Sense* is included with the Commodore 1660 (Modem 300) and Commodore 1670 (Modem 1200). If you do not have *Common Sense*, the principles we use will still apply, but the way you activate each of the features will differ. See your terminal software instructions for details.

Loading *Common Sense*

Turn on your disk drive and insert *Common Sense* into drive 8 of your system. Now turn on your computer. Please note—if you are using a 128, you must power up in 64 mode. (See your 128 users manual for instructions.) When you get the ready prompt and flashing cursor, type LOAD "BOOT",8. When the ready prompt and flashing cursor return, type RUN. *Common Sense* should now begin loading. After a short time, the title screen will appear.

Dialing

If you have the model 1670 modem, you may want to set the baud rate; the default is 1200 baud. Refer to your Modem 1200 manual for details if necessary. Setting the baud rate is not necessary for any of the other Commodore modems as they all operate at 300-baud only.

BBS and commercial systems are designed with the new user in mind, so you cannot damage the system by entering a wrong key or message.

Dialing is done differently for each of the Commodore modems. If you have a 1670 you will use AT commands to access your modem. (The AT commands and their syntax are explained in Table 3-1 of the Modem 1200 manual.) The 1660 is dialed through a built-in feature of the program; this is the Commodore-A command. (The listing of all available commands can be found under Command Reference in the Modem 300 manual.)

Here is an example of dialing the 1670. Type in the following command (all letters must be upper-case): ATE1. You will not see the command as you type. After you enter the command and press RETURN, you will see an OK message on your screen. What you have just done is turn on the echo of modem commands to the screen. Now that you can see what you are typing, let's dial the number. Here is an example of 1670 tone dialing: ATDT7527841.

The syntax for entering the number will vary if you are using pulse (rotary) dialing. Just replace the second T with a P: ATDP7527841. After you press RETURN, you should hear a dial tone and the number being dialed. Remember to substitute the proper number for the service you are calling for the number listed above.

Now let's dial the 1660 modem. Press the Commodore key and the A key. The second line up from the bottom of your screen will now change. Next press CONTROL key and D to dial tone or the CONTROL key and P to dial pulse. You will then see a special character that represents the dialing mode appear on your screen. Now type the number you want to dial and press RETURN. Like the 1670, you will hear the dial tone and number being dialed.

With both the 1660 and 1670 modems, you will be able to hear how the phone call progresses due to the modem's built-in speaker. This is the same as if you had the phone receiver at your ear.

Logging On

Each system, commercial or BBS, has their own method of logging on. If you are calling a commercial database system, the operator of the system should supply you with detailed instructions for logging on at the time you subscribe. BBS's do not normally supply you with information on how to log on and most differ from each other.

Some systems require the use of a RETURN after entering information and others do not. If nothing happens after you enter your information, try sending a RETURN. BBS and commercial systems are designed with the new user in mind, so this means that you cannot do any damage to your computer system or the system you are calling by entering a wrong key or message. Almost all the information you need is displayed. Some BBS and commercial data bases require the use of a RETURN or two when they first answer the phone before any information is sent. This RETURN is most often used to determine the baud rate you are currently using.

Here's how to log on to the two BBS's we mentioned in our last article.

Computer Addicts Anonymous (CAA): After dialing CAA and the modem connects, you will see a short title screen followed by a request for your first name and then your last name. After you enter this information, the system pauses. During this pause, CAA is checking to see if your name is recorded in the CAA records as a current user. The next request will be for the city and state you are calling from. After this, all the information you have entered so far will be displayed with a request asking if the information is correct. If you have made a mistake, enter NO and reenter the information. When everything is correct enter YES. These questions will only be asked on your first call as a new user. The next time you call, CAA will know you and none of the questions will be asked.

Now you will be requested to enter your terminal width. This is the number of characters your screen can show on one line (*Common Sense* is 40). You will now be requested to select a terminal type (also known as your computer type). There are 14 choices. Simply enter the letter that matches the type of terminal (computer) you are using. A listing of the settings that will be used for your call is displayed to you along with the option to modify them if necessary. For most callers, the settings that are displayed will not have to be modified. Now comes one of the important items—the request to enter your password. This password along with your name and city are what identifies you.

After entering your password, you will see the highest message number available to read and the highest message number you have read to date (this will be updated each time you call and log off). Following this is a short message from the SYSOP (System Operator) telling you things like new items added to the BBS and or changes made to the BBS along with any other items the SYSOP wants you to read.

Now you will be presented with the CAA main menu. This is a listing of all the available options you have on CAA. You may not understand some so if you have any questions send a note to the SYSOP via feedback (this is how you send a message to the SYSOP). Feedback messages result in a speedy reply.

We won't go into any further details on each of the menu choices because learning what each one does and finding your favorites is the fun part.

Always use a password that will be easy for your to remember, but not for someone to hack (or guess).

ARB BBS: After dialing ARB and the modem connects, you will not see a title screen until you send two RETURNs. Now you will see a short title screen followed by a request for your full name (both first and last). The system will then request your password or the word NEW if you are a first-time user. This will be followed by a few opening messages from the SYSOP and then the ARB main menu. As a new user you will want to select the + option: Registration. You will be asked several questions about yourself and then choose a password for future access. After entering all your information you must verify that it is correct. If you have made a mistake enter N and reenter the information. When everything is correct, enter a Y and you will be returned to the main menu.

Some of the options you see listed on the menu are not available to a new user. The SYSOP will give you access to other options of the BBS after reading the information you supplied in the registration area. If you do not understand some of the options or if you have any questions about ARB, you can always leave a note for the SYSOP. The menu choices are best left for you to explore.

Passwords

Always use a password that will be easy for you to remember, but not easy for someone else to hack (or guess). A bad idea would be to use your first name as your password or other things that are easy to guess. Try to make it two words that are not related—for example, dogphone.

A word of caution—never use the same password on more than one system, and if possible, change it often. The reason for not using the same password is so that if someone finds out your password, they would not be able to gain access to all the other systems you may use. And never tell anyone your password. If you do, someone could use your password to log onto a system disguised as you and anything they do is reflected on you. And if the system happens to be a commercial data base, the costs incurred while someone else is using your account is charged to you.

Free Software?

Well, not exactly free. You have to had to buy a modem and maybe a telecommunications program. The final item you need is a BBS or one of the many commercial telecommunications services. This leads us into our next part of learning about telecommunications: uploading and downloading.

Uploading and Downloading

Uploading and downloading are also known as file transfers. This is because its most common use is to transfer files or programs. Although both programs and files can be transferred, both are referred to as a file transfer. File transfers would be much easier if there was only one protocol for transfers, but there are more than one type available to the Commodore user. The established ones for Commodore users are Xmodem and Punter.

The reason a protocol is used for transferring information is to make sure that the information is received exactly as it was sent. What happens is the sending computer adds a checksum to the end of each block of information before it is sent. The receiving computer then creates a checksum based on the information it received and compares its checksum against the sending computer's checksum. The two checksums must match exactly. If they do not match, then some interference was present and the information received is not correct.

When the checksums do not match, the receiving computer sends a signal to the sending computer and the sending computer resends the same information again. *Common Sense* supports Xmodem file transfers as well as B protocol-type of file transfers.

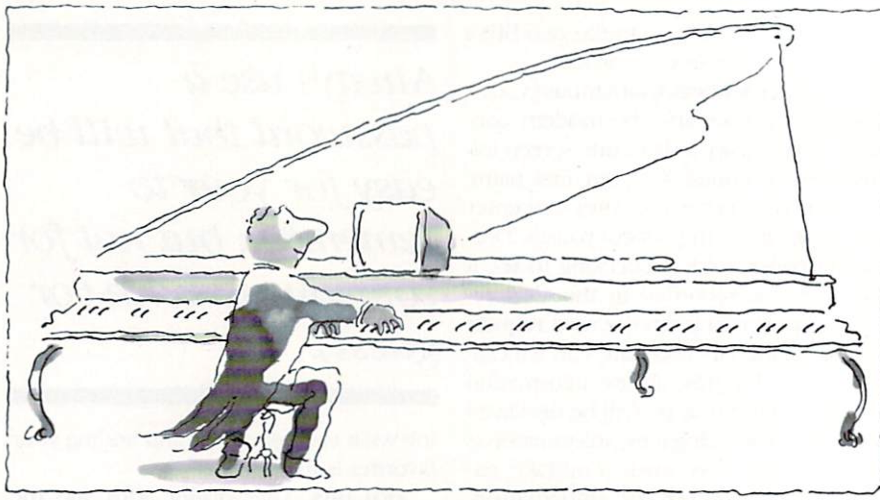
Some of the larger commercial database services have their own protocols of file transfer (or system-specific). CompuServe uses B protocol in addition to Xmodem. QuantumLink requires a special terminal program (available directly

Continued on pg. 82

BY ROBERT W. BAKER

Inside QuantumLink

Explore the inner workings of the QuantumLink telecommunication service with network pro Bob Baker.



If you have an interest in creating music, you'll enjoy Q-Link's Musicians Network. This area was formed as a resource center for musicians who are interested in electronic music and other related topics. The Musicians Network offers up-to-date information concerning MIDI, keyboard techniques, new products, and provides upload/download libraries containing public domain programs, keyboard patches, editors, librarians and digital samples. There are now over 160 Mirage wavesamples and over 10,000 DX-7 patches in their library.

Message boards cover everything from what's new to selling your synth or software. Additionally, the modern musician can get technical advice in the Musicians Resource Center from groups like the MIDI Hackers Group, where you can exchange tips and tricks about MIDI and MIDI programs, or the Mirage Users Group, where Mirage owners can give and receive advice on sampling, loops, and so on. There's even raw wavesamples that can be downloaded and sent to the Mirage Users Group with a public domain program.

Dr. T's Music Software and Sonus Software are two companies that specialize in music software and who are now online to answer questions from their users. And there's a conference room in the Network area where musicians can get together and rap or participate in a bimonthly meeting on the second and fourth Sunday at 10:00 eastern time in People Connection.

Q-Link covers the Amiga too...

Most Commodore 64 and 128 owners know about the wealth of information and services available to them on Q-Link these days, but many Amiga owners may not know there's something for them, too. There's a special section of message boards devoted just for the Amiga in the Comments and Questions section of the Commodore Information Network. These message boards cover both hardware and software issues, as well as all kinds of general topics concerning the Amiga. They give you a convenient place to share information with other Amiga users or get help with that tough problem when you need it.

There's even a special Amiga message board where you can describe yourself, your system, and any of your special interests. This message board lets users with similar interests easily find and contact one another. It also gives other Amiga owners a little insight into who you are and what you do when reading the messages you post.

The biggest thing many Amiga owners aren't aware of is that they do have access to public domain software and other downloadable files from Q-Link, even though they cannot log-on with their Amiga system. The only drawback is that they still need a Commodore 64 or 128 system to access Q-Link.

After browsing the software libraries to locate the desired files, you download them using the normal Q-Link download procedures. After logging off Q-Link, the files can be transferred to your Amiga with a minimal amount of work.

But keep in mind that to transfer the files that you downloaded, you need a thing called a null modem and a set of terminal programs for both systems that support the Xmodem file transfer protocol. The null modem is really a cable between your two computers with no (null) modem or phone line between them. There are actually two ways this can be done.

The simplest method is to use what is normally called a null modem cable. This is a standard modem cable with pins 2 and 3 cross connected. That is to say, pin 2 at one end is wired to pin 3 at the other end, and vice versa. Pins 7, 8, and 20 are wired straight through, each of the three pins connected to its corresponding pin at the other end. On the Amiga, the null modem cable can be connected directly to the serial port (RS-232). Be careful though, since there is power supplied on pins 14, 21, and 23 of the Amiga serial connector that can damage your 64/128 if wired incorrectly. Some commercial cables may have these pins wired through.

On the 64/128, the null modem cable must be connected to the computer's user port via a RS-232 interface adaptor to obtain the correct interface voltages. You can use something like the older VIC-1011A module or similar modem or printer interfaces available from Omnitronix, Handic, or others.

The second method of connecting your two systems requires two similar speed Hayes-type modems, one on each computer, to set up another type of null modem. In this case, a short phone wire is used to connect the line inputs of the two modems together without using the public telephone lines. Once wired properly, the two modems can then be connected by placing one modem in answer mode while the other is in send mode. On one computer, the following Hayes commands are sent to the modem:

+ + + ATZ [RETURN]
+ + + ATD [RETURN]

Then on the other computer, these commands are sent to the other modem:

Continued on pg. 82

BY HERBERT SWARTZ

Copyright Update

Lawyer Herbert Swartz explains the legal paradox a user is faced with when it comes to software copyright protection.

Federal copyright protection for software confers a 75-year monopoly on the expression of an idea and the copying, distribution or making of derivative works of the product in which the idea is expressed. The public has access to a work, and full use of it as well, once the creator or author places it into the marketplace.

This brings up the question of exactly what is covered under copyright protection. To get an answer, the initial issue of copyrightability had to be resolved. Are computer programs the "literary works" the copyright scheme embraces? The 1976 Copyright Act did not say specifically. But by 1983 the federal judiciary had provided its response. In a number of cases (primarily involving Apple), courts have ruled yes. Lawyers refer to the pre-1984 period, in which computer programs were found copyrightable, as the first generation of computer law.

The present is described by these same attorneys as the second generation of computer law. At issue is the question of copyright infringement. Since a computer program *is* copyrightable, how much copying—and of what and in what manner—constitutes copyright infringement?

On that question, the first generation of computer law was straightforward because the cases involved outright duplication. Now, however, defendants come in a different hue. They have been labelled as "paraphrasers." No literal copying of the first work is present. So where lies the line of copyright infringement?

For more than a century, copyright law has drawn that line at "substantial similarity." Copyright law has always been broader than unadulterated copying of the entire work. But applying the line of "substantial similarity" to "paraphrasing" is far more tenuous. In this way, the controversy is inevitable, with the second generation of computer law more challenging than the first.

And if proof of the controversy was needed, the three cases that appeared in the summer and fall of 1986 have provided it. Each case resulted in victory for the copyright holder charging infringement. The reach of copyright law has been extended broadly—but too broadly argue critics.

After all, copyright *is* a lengthy monopoly, a curse to our legal and economic systems. As a result, the monopoly must remain within narrow constraints (that is, expression only) to be tolerable. If there is broadening of the monopoly—say, in computer software—there is no room for later creators to play catch-up. Do we really want a computer universe, critics ask, in which, say, the first spreadsheet developer is given a lock on the market? And for 75 years? Of course not, they answer. But that is where we could be heading, they warn.

The actual broadening of copyright law in relation to software began in August of 1986. The United States Court of Appeals for the Third Circuit (sitting in Philadelphia) held that copyright protection for a computer program extends beyond its literal code. Protection also encompasses its structure, sequence and organization. In short, much more than source code and object code.

There are only so many ways to tell the story of Pearl Harbor, and likewise, only so many ways to create a spreadsheet program.

The defendant in *Whelan vs. Jaslow* contended that such a ruling would take copyright into impermissible territory. To find that his program for managing a dental laboratory infringed the plaintiff's program for the same purpose would be taking copyright beyond the protection of expression but rather into the protection of the *idea* and *function* in a work, two areas that The 1976 Act says, specifically, are excluded from copyright protection.

But the court saw things differently. "The conclusion is thus inexcapable," it said, "that the detailed structure of . . . the program is part of the expression, not the idea, of the program." The court used similar words regarding "function."

Critics now claim a paradox. Copyright law, as based in the Constitution, is designed to further "wisdom and knowledge" by providing financial rewards for authors so they will opt to be more productive. However, give those initial creators too much protection and later creators will be prohibited by the first monopolies, and wisdom and knowledge (in our case, the development of further software) will be curtailed.

But, according to the court, "(Its ruling) would provide the proper incentive for programmers by protecting their most valuable efforts, while not giving them a stranglehold over the development of new computer devices that accomplish the same end."

Then the court turned to infringement, the search for "substantial similarity." "The relevant inquiry," it said, "is not whether most of the program's steps are similar, but whether the most significant steps of the program are similar." They are, the court concluded.

"There is no doubt," comments attorney Robert Bigelow of Warner & Stockpole in Boston and editor of the *Computer Law* newsletter, "that the dividing line between a program's idea and its expression has now shifted closer to the idea end of the spectrum. The fuzziness of that dividing line, however, is even greater now that a program's 'structure' is the focal point."

In September of 1986, the dividing line between expression and function shifted even closer to the function end of the spectrum when a federal district court in California held microcode to be copyrightable. Copyright protection for software, in essence, has lapsed into copyright protection for hardware, argue critics.

Then in October of 1986 following the teachings of *Whelan*, another California federal district court extended copy-

Continued on pg. 107


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BY DAN SCHEIN

Tech Notes

This month we revive our popular Tech Notes column.

The 1987 Consumer Electronics Show in Las Vegas has come and gone. I am not a gambler—but there is something about Las Vegas that can convert you. Being of sound mind and empty wallet, I stuck to my guns and didn't gamble (well, not more than $10 anyway). I did come back with the thoughts of ALL ($$$) the money could have been won, but that was then and this is now (sigh). But the editor, not wanting me to feel bad about all that money, quickly gave me some gaming programs for the Commodore 64. Now I had a second chance to win it.

Video Vegas

This program is listed as an education and entertainment package on the package. And with my luck, it's certainly advisable to obtain an education at home versus at the casinos! The game offers Slots, Blackjack, Draw Poker and Keno. You are given $1,000 to begin.

First I was off to the Lucky 7 slot machine where I quickly lost $100. Next stop the Draw Poker table where I was luckier. I left the table with roughly the same amount I arrived with. Not too bad for 15 minutes of play. Blackjack was next on my trail of gambling. I left the Blackjack table $10 ahead. My final stop was Keno. Now Keno is a game that I never understood. Thanks to the included manual I now know how to play. Now if I could only win!

In addition to teaching about Keno, the manual also explains the basics of a slot machine, a general rundown of draw poker, and a good explanation of Blackjack. The Blackjack portion of the book even includes a section on explaining the art of card counting.

Casino Craps

This program gives you three different versions of craps: Basic game, Alley craps and Casino craps. Basic craps is described as being an army-blanket introduction and is recommended for the novice. Alley craps is a multiple player version for two to eight players. Here everyone bets against the shooter and the shooter must play by the same rules as on a casino table.

An important option for the beginner is Definitions. This acquaints you with the wide variety of bets and terms in casino craps. The random rolls option allows you to roll the dice for a selected number. This lets you get a summary of the rolls including the occurrence of each number. Included is a paperback book called *A Book on Casino Gambling*, which is a great guide to the rules and strategies of several different casino games. If you do not know how to play craps and want to learn, or you are an experienced craps player and want to bone up on some hints, this game's for you.

Till next time, happy computing! ■

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Casino Craps
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(307) 382-3456

BY MATTHEW LEEDS

How to Get Your Program Published

Have you written the world's best word processor? Have you created a text adventure that will keep players at the screen for a week straight? Do you have an idea for a new type of software? Now if you could only sell your idea to a software publisher...



ART BAXTER

Having gone through the process myself at one point (unsuccessfully), it seems like a good idea to find out how best to proceed. I interviewed the heads of acquisition at four software companies: Patty Collis, Acquisitions Coordinator for Broderbund; John Manley, Product Administrator for Electronic Arts; Bob Lindsey, Director of Creative Development for Epyx; and Richard Lehrberg, Vice President of Product Acquisitions for Activision. I've taken their advice, mixed it with a few observations of my own, and presented the results here. Although I can't promise that following the ideas and suggestions made here will result in a contract with a publisher, they do make for a good start.

The first thing you should do, even before you contact any publishers, is evaluate your program. Is it the best you can do? Can you improve it? Try showing it to friends. Have them use it, play it, test it. Compare it to similar programs already on the market. If it isn't at least as good as they are, go back to the drawing board.

Collis: We're interested in picking up products that are a step or two beyond what is already on the market or maybe fills a gap in the marketplace.

Lehrberg: One mistake programmers make is trying to emulate an existing product. Publishers are looking for tomorrow's product.

If you're sure that the program is your best effort and it's up the standards of the industry, there are some other factors to consider. There are only a few programs published each year. Most of them are published on more than one type of computer. Publishers generally want programs that can be ported across to other computers and want programs written in either assembly language or C. BASIC or compiled BASIC programs are very rarely accepted. Utilities that run on only one machine are rarely accepted, although with the huge installed base of Commodore 64's this can vary.

Lindsey: We don't like to acquire a product for one system only. We need something that is applicable on all systems. We wouldn't necessarily turn down something done in BASIC, but we prefer assembly language because it handles our graphics well.

If all you've got is a great idea for a program, try to find a programmer to develop it for you. Most of the publishers I spoke to said their companies preferred submissions that include a working version of the program. This is not written in stone, but your odds improve dramatically if you can provide a working version, even if it is not finished.

Collis: We're looking for products in program form. It's much easier to evaluate a product in working form, even if it's not completed. If everyone can take a look at it, play around with it, we can get a better feel for the product.

Manley: This is where Electronic Arts is a little different in that we are not developers, we are publishers. Part of the summary we supply in our artist's kit explains that. We do not encourage submissions that do not include a workable version of the program.

Lehrberg: There is one product we are working on now that came from a woman who is an artist, not a programmer. She's an avid gamer and had a great idea for a game. We've matched her with a programmer and are developing a product.

Lindsey: It's very difficult to acquire a concept. From a legal standpoint, we try to shy away from them. It's not our policy to accept them.

You should also try to determine what is special about your program. The industry does not need another Pac-Man clone. If you can't find something special about your program, the buying public won't be able to either. Great software is like great literature—it has staying power.

Manley: Does the computer bring something to the party? A chess program is enhanced by being on a computer because you can play the computer, take your moves back, or analyze the moves. Some games are not improved by being put on a computer. What we're looking for is a great spark in the software, something we can hang a concept on.

Once you've gone through this process, and you're still sure you want to send your program or idea in, it's time to start researching which publisher to submit to. Every software publisher has an artist's submission kit. Generally it contains the guidelines for submission, a non-disclosure form that provides some protection for your program, and a product catalog. Study the product catalog, get a feel for the types of programs published by each publisher.

Collis: They should definitely take a look at some of our products to get a feel for the kinds of things we publish. They should also look at what's out there.

Manley: A lot of the people who submit to us are already customers. They call up and say, "I have your products and I love them and here's my idea for a game."

Now that you've gotten the submission kits, read over the product catalogs, and decided on which publishers you're going to contact, it's time to ready your package for submission. Be sure to label the disk with the program name, the type of machine it runs on, and your name. Include instructions on how to run the program, any other needed documentation, and a stamped self-addressed envelope for the return of your package. Most of the publishers I've talked to will look at multiple submissions, so if you want to send your program to more than one publisher at the same time, go ahead.

Collis: We prefer to get the first look at a product, because that way we've got first

Continued on pg. 110

In every city of this country, someone is waiting to meet you.

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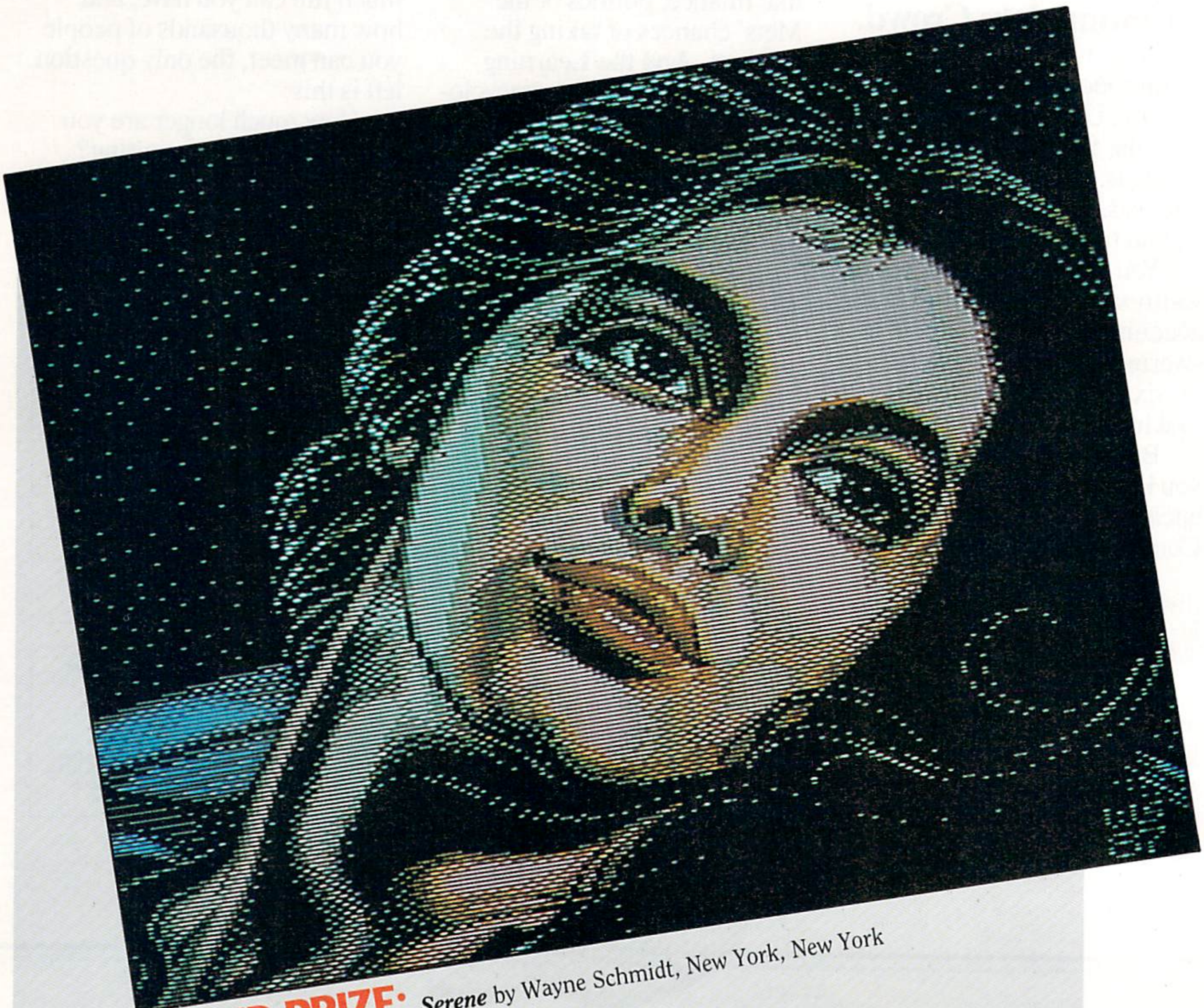
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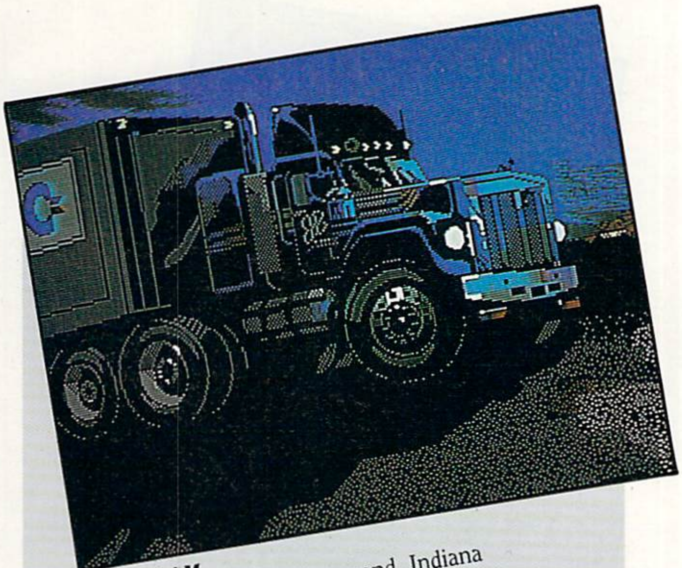
Winners of the Commodore 64 Graphics Contest

The judges of the second annual graphics contest had to make some tough decisions to narrow down the over 250 entries to the top 21 that showed the most originality, creativity and best use of the 64's graphics capabilities. Commodore 64 owners are certainly a talented group! It was especially interesting to note that the winners' ages ranged from 14 to 48. We only regret that we could not reproduce copyrighted images.

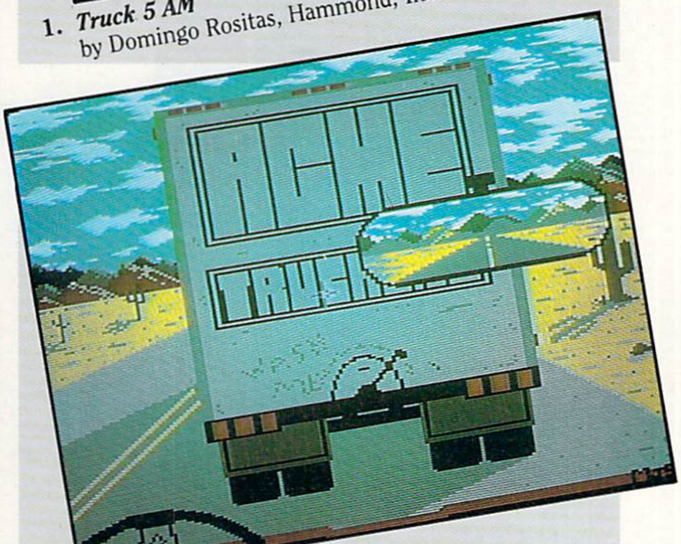


GRAND PRIZE: ***Serene*** by Wayne Schmidt, New York, New York

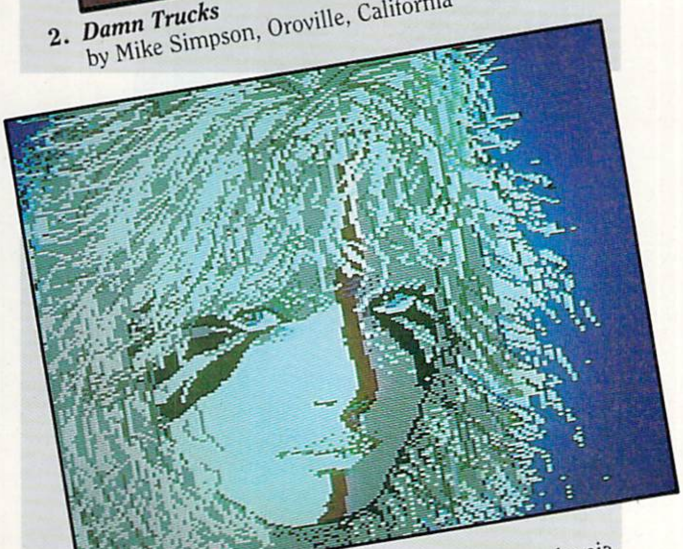
RUNNERS UP



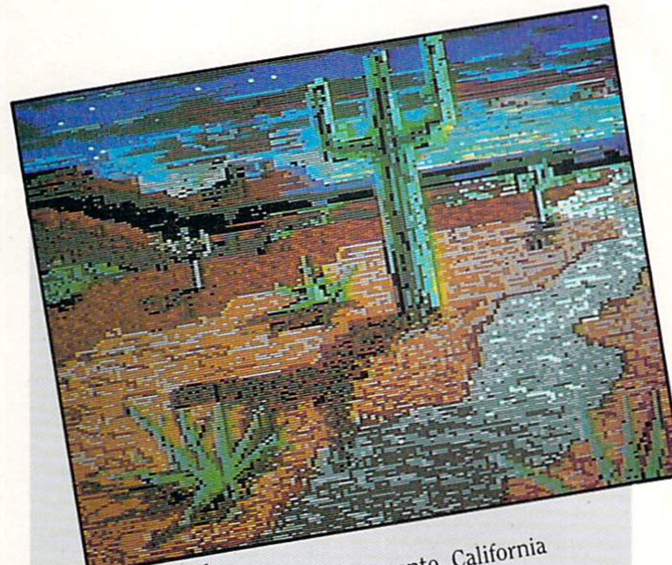
1. ***Truck 5 AM***
by Domingo Rositas, Hammond, Indiana



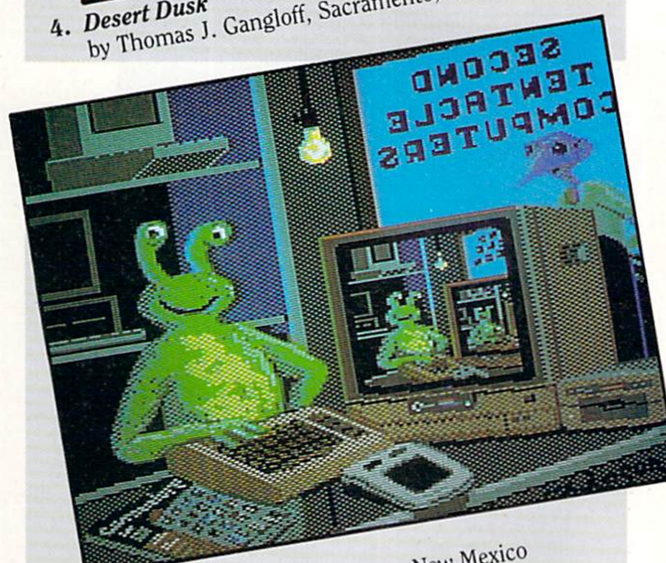
2. ***Damn Trucks***
by Mike Simpson, Oroville, California



3. ***Daryl***
by Oliver D. Golembiewski, Philadelphia, Pennsylvania

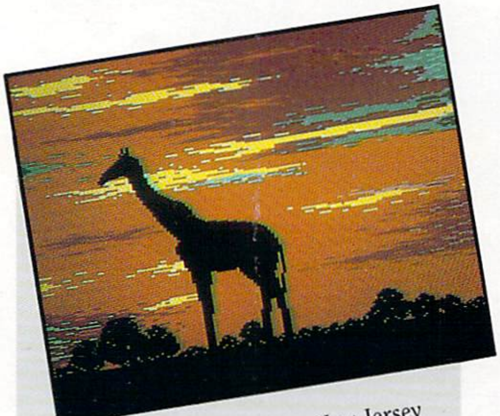


4. ***Desert Dusk***
by Thomas J. Gangloff, Sacramento, California

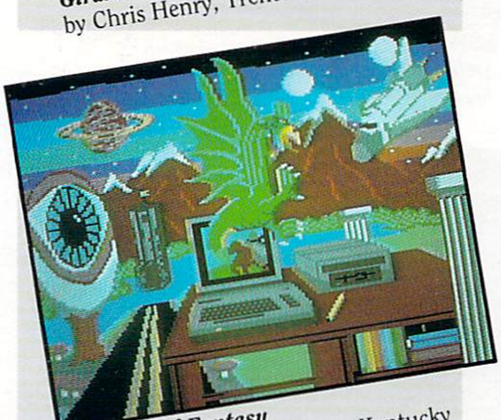


5. ***Hack Shop***
by Eddie Johnson, Albuquerque, New Mexico

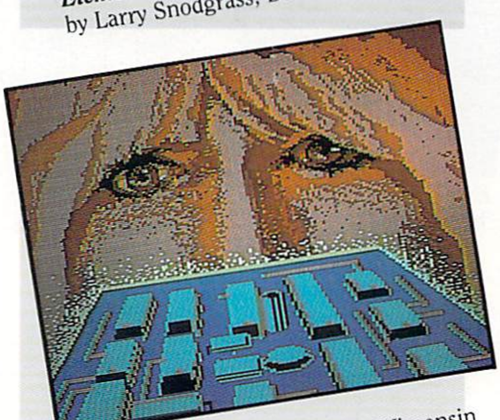
HONORABLE MENTIONS



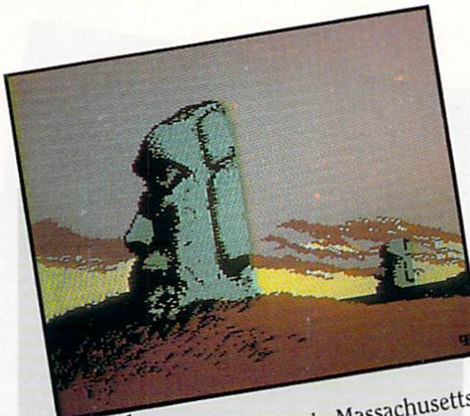
Giraffe
by Chris Henry, Trenton, New Jersey



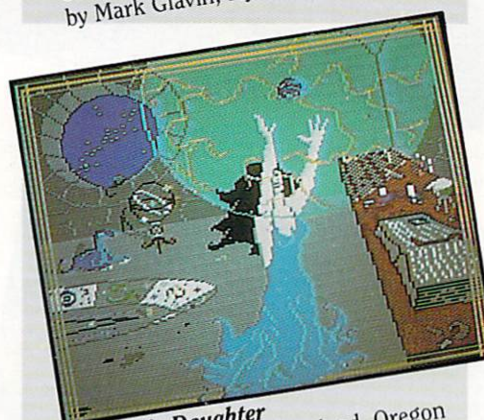
Elements of Fantasy
by Larry Snodgrass, Bellevue, Kentucky



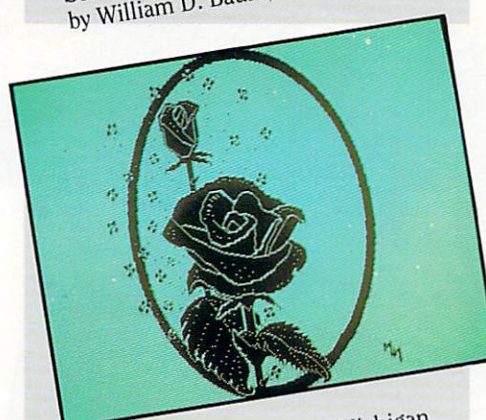
Contest
by Gary Leonard, Germantown, Wisconsin



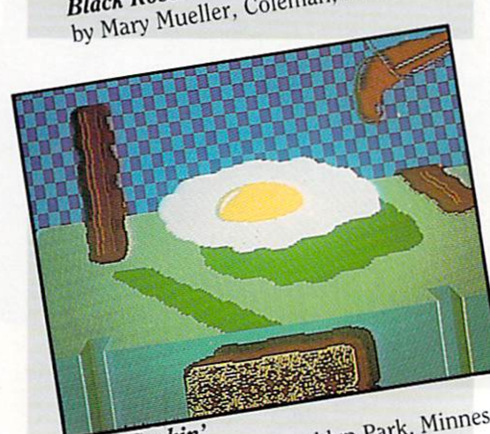
Solitude
by Mark Glavin, Hyde Park, Massachusetts



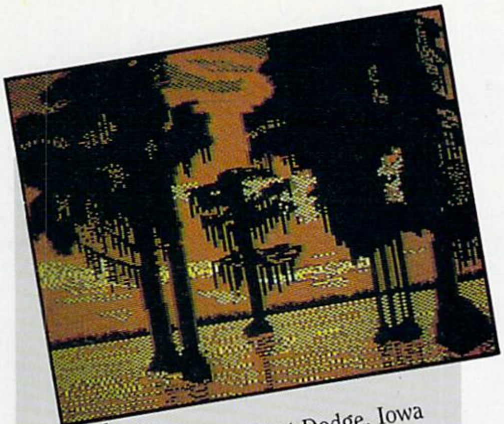
Sorcerer's Daughter
by William D. Baum, Portland, Oregon



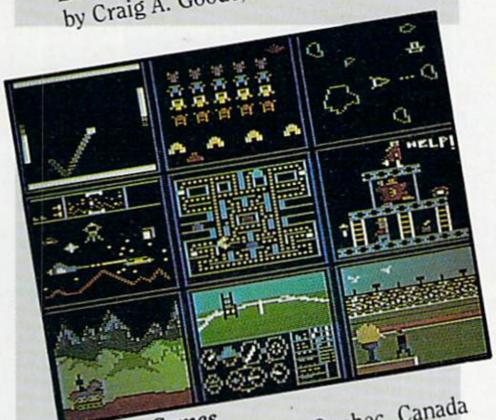
Black Roses
by Mary Mueller, Coleman, Michigan



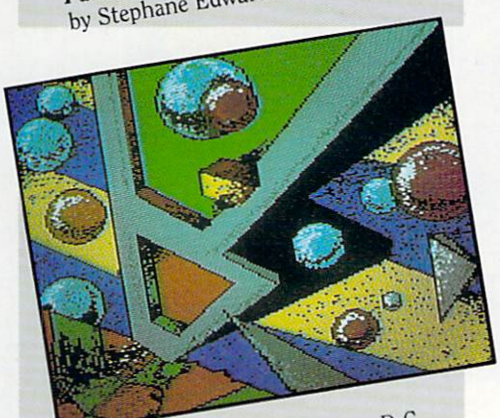
Home Cookin'
by Andy Chisenhall, Brooklyn Park, Minnesota



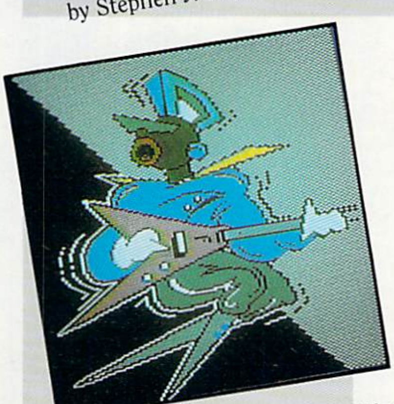
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by Craig A. Goode, Fort Dodge, Iowa



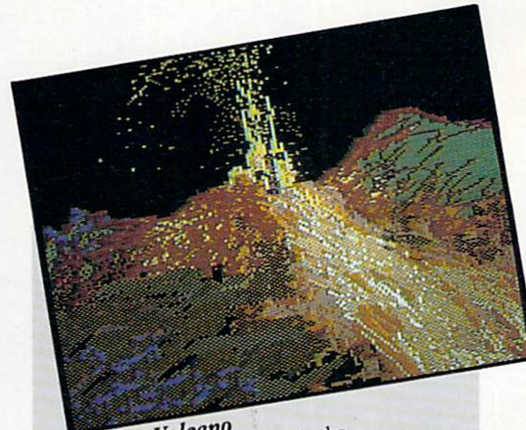
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by Stephane Edwardson, Quebec, Canada



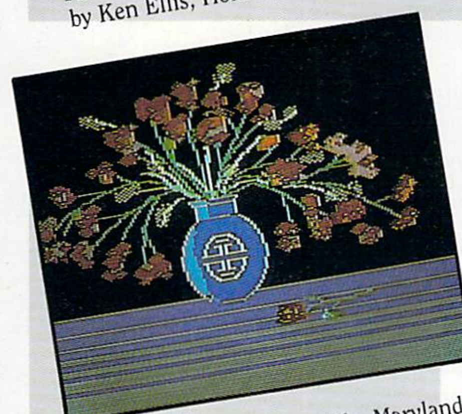
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by Stephen J. Day, Washington, D.C.



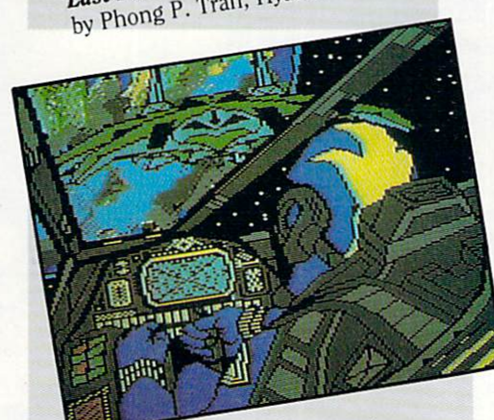
Rock'n Roll
by Michael Twigg, La Jolla, California



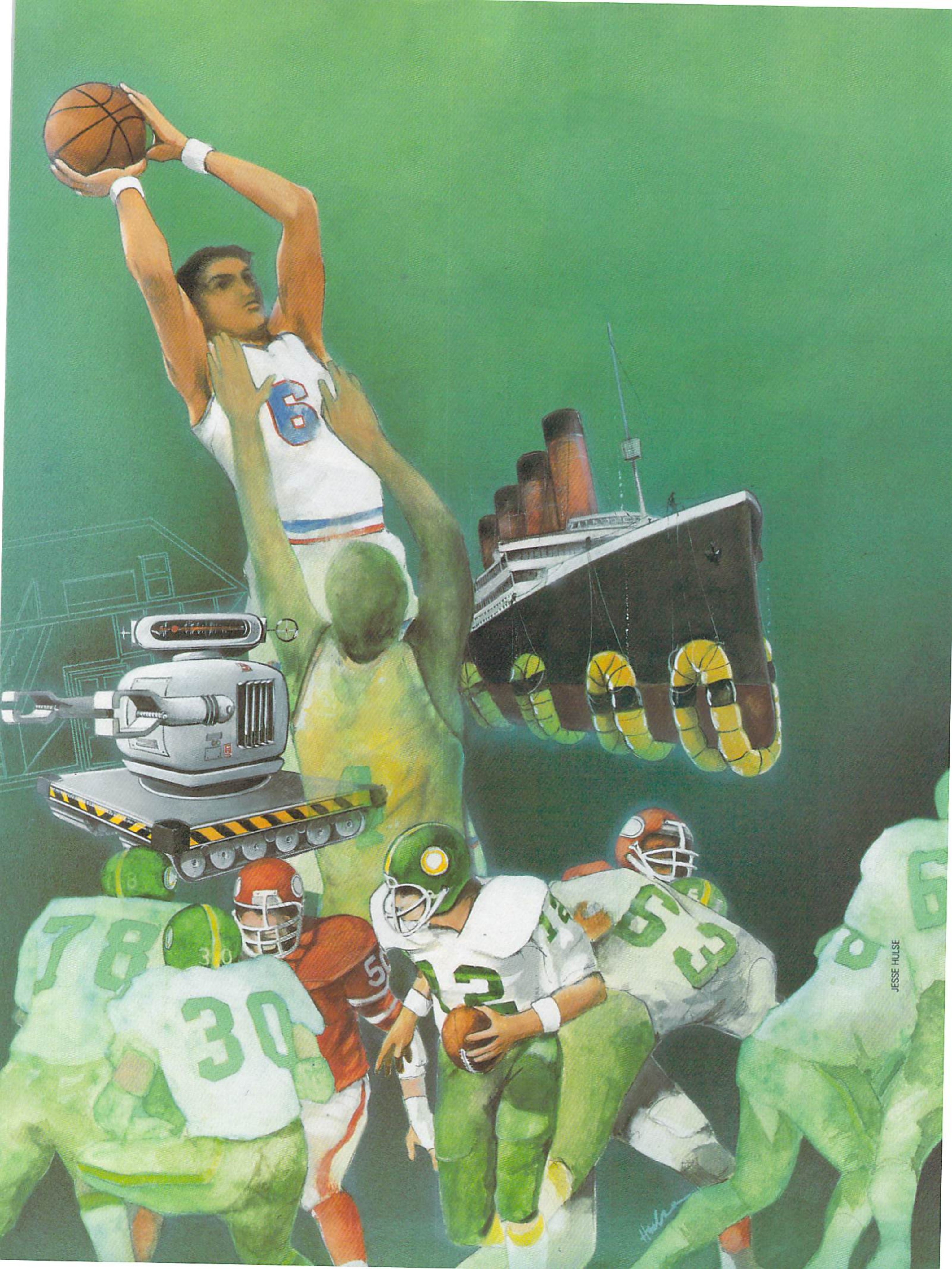
Kilauea Volcano
by Ken Ellis, Homer, Alaska



Last Flower
by Phong P. Tran, Hyattsville, Maryland



The Encounter
by J.L. Hitt, Pacoima, California

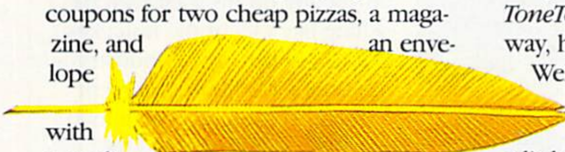

JESSE HULSE

Behind the Scenes at Activision

Duck Feathers, Cigars and Bill Cleary

by Gary V. Fields

The stimulus for this article was provided by a very innocent activity—I opened my mailbox. Inside was a bill from the electric company, a pack of coupons for two cheap pizzas, a magazine, and an envelope



with a small yellow feather in it. "A feather?" I thought, "Why would anyone send me a feather?"

Two days later the mail brought a single guitar pick. No music, no guitar, no strings—just a guitar pick. "Rather odd," I thought. Later mail brought a foot-long cigar (I don't smoke), a cassette tape labeled "A Message from the Future," and a small robot toy (my five year-old confiscated it).

Two weeks later another envelope from the same source arrived. My first impulse was to simply discard it. I could tell from its size and weight that it contained only paper. But when I sliced open the edge, a well used, but perfectly spendable, five-dollar bill fluttered out. A note with the money suggested I buy a ticket to see the movie *Aliens*. My curiosity about the company sending such unusual mail was now aroused.

All this weird mail was from a software company called Activision, and was intended to generate interest in their newest releases. The feather and cigar were to promote the arcade version of the movie *Howard the Duck*, the robot introduced *The Transformers: Battle to Save the Earth*, and a guitar pick is an important element in the game called *Tass Times in ToneTown*. All the mail, in some way, had to do with their software line.

Well, if the odd mail was intended to get my attention, it worked. Not only that, but it worried me a little as well. Could people who send duck feathers and five-dollar bills to total strangers be playing with a whole keyboard? What kind of company does business this way?

I found my answer in a red tiled two-story stucco office building just off Highway 101 in Mountain View, California. It was from that building that all my weird mail was being generated. Inside I found Bill Cleary. At age 39, he is Activision's vice president in charge of marketing. [Shortly before this article was published, Bill Cleary resigned from Activision. But Activision will no doubt continue to be an innovative force in the industry thanks to the visions of Bill Cleary. We felt that the popularity of the products discussed warranted publication of this interview, and we wish Bill Cleary the best of luck.] Oddly enough, considering the kind of mail he daily stuffs in U.S. mail slots, he seemed like a regular kind of guy. Loosening his tie, he leaned forward across his desk to face me and smiled. It was 3 p.m. By 6 p.m. I would know more about Activision than I had ever hoped.

It turned out that the entire crew of



Activision is weird, but in a most delightful way. In an age when most companies take themselves too seriously, the people at Activision still enjoy a good laugh. The motto there seems to be that professionalism doesn't necessarily exclude fun.

Activision's fun began way back (in terms of computers) in 1979, when a small group in Sunnyvale formed a video game company. A lot has changed since then, but the enthusiasm at Activision has survived. In the early 80's the company was riding high selling $300 million worth of video games to a joystick-crazed public. But half way through 1983, the bottom dropped from that market. People abandoned dedicated video game machines for computers.

Most of those companies simply faded



into history, but not Activision. The company's former president, James Levy, cut expenses and staff to the minimum in an effort to absorb the financial losses caused by shelves packed with unmarketable video game cartridges. It took him two years to stabilize the company, absorb the red ink and revive Activision as a force in the computer software market. Recovery was assured when four of the titles Activision brought to the market in 1985 became hits: *Hacker*, *Alter*

Ego, The Little Computer People, and *GameMaker*.

Now, two years since that rebirth, Activision is not only back, but is one of the leading entertainment software producers for the Commodore market. In 1984, the company marketed a dozen titles. In 1987 that number grew nearly fivefold and their shelves boast not only entertainment software, but creativity and productivity packages. The company supports not only the the Commodore 64, but the 128 and Amiga as well.

But back to my weird mail. After a few minutes with Cleary, I knew the company and man who sent such strange mail were anything but unbalanced. Here was a fellow who knew his business, knew what the market wanted, and was ready to deliver it, yet intended to enjoy doing it. And part of that fun included taking a fresh and different way in promoting their products.

Fields: Activision has some of the most outrageously delightful promotional tricks I've seen. Who thinks up these schemes?

Cleary: A computer is something you have fun with, you learn with, you communicate with—it's many things. Most of the people here use personal computers at work and at home. We just try to say "Hey, what is the average person we are trying to communicate with like? What does he want? And what is the most effective way to communicate with him?" So we try to come up with the most wacky and outrageous promotions possible. It's a group effort. We are just normal people who like to come up with creative ideas about how to communicate with the press and the people who are buying our products.

Yeah, we do a lot of wacky stuff. That's part of our roots—our history as Activision. We don't think it's so wacky, we just think it's fun. This is a business you can have fun with, so why not?

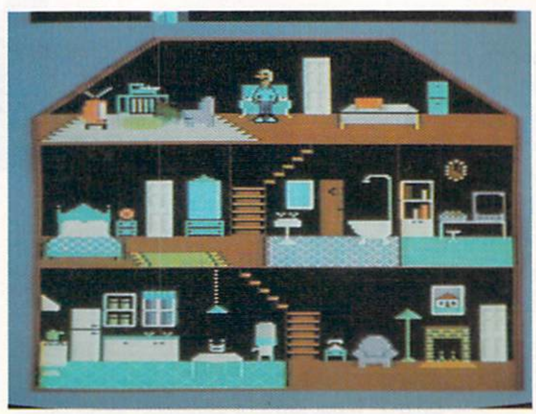
Fields: Do they work?

Cleary: Absolutely. Everybody sends out the standard news release. After a while you get so many of the things, it's refreshing to get something fun coming across your desk. That's what we do.

Fields: It seems Activision is buying a tremendous number of software vendors. Can you tell me a little about that? How many companies has Activision acquired?

Cleary: Since we are an international company, we have relationships around the world. From a business perspective it makes a lot of sense to be with a company with a lot of distribution clout like Activision. We have acquired companies which had expertise in specific areas of the business. For example, we bought Creative Software which was the base on which we built the Personal Choice line of productivity software. We bought an expertise and a talent that we integrated with our system. We also bought Gamestar, which was a tiny little company but had great sports products.

"For bright, innovative, creative people there will always be an opportunity to make a small fortune in programming."



With the purchase of Infocom, we bought a company which literally owned text adventures. This is the company which started with products like *Zork*. They came up with their own language, the Infocom parser. Now their smash hit, which we can't keep in stock, is *Leather Goddesses of Phobos*.

Fields: In 1984 Activision offered six titles for the Commodore 64. How many titles bear the Activision logo now?

Cleary: I'm not sure if your figure of six is right. I think we had around a dozen separate titles on the shelf in 1984. But now that number is approaching 60 different products. We now support eight systems, including Commodore's three top computers.

Fields: What was the catalyst which began the transformation from just another software vendor to one of the largest in the industry?

Cleary: James Levy, the founder of the company, was the catalyst which made Activision what it is. He saw it through some very tough times. Now we are a leader in the industry.

Fields: What is your most popular software?

Cleary: That is a trick question. Most popular? Well, it would have to be the Gamestar line. I like sports and it is as close to the real thing I can get in my office.

Fields: What is your most profitable software package?

Cleary: Of the newest releases, *Hacker II* is a blockbuster of a program. By the end of 1986 it had already sold well over 50,000. And, of course, *GFL Championship Football, Leather Goddesses of Phobos, Transformers* and *GBA Championship Basketball* are right up there. It's hard to say when you have so many titles. But I personally really enjoy *Two-on-Two*.

Fields: Are there any sleepers on Activision's shelves which, for some reason or another, never got the exposure they deserve? (Cleary's fingers tapped his desk as he pondered his response. As the person in charge of marketing Activision's software, I'm sure he hated to admit any on his shelf weren't selling like electronic hotcakes. But like in the movie industry, the timing of releases, current fads and packaging appearance are often as important as the products themselves. Those factors sometimes prevent the would-be user a chance to hear about good products. After a moment he turned back toward me and answered.)

Cleary: A few. *Shanghai* and *Tass Times in Tonetown* could be described as sleepers. I think some people think of *Tass Times in Tonetown* as a California product because of its name and the hip characters it creates. But it's really a fascinating game. People are beginning to warm up to it. And *Shanghai* is one of my personal favorites. If they are sleepers, it's because I didn't wake them up enough.

Fields: You already offer software titles covering everything from spreadsheets to arcade games. What's left to offer that you don't already stock?

Cleary: I can think of about a million titles that we don't have. There are areas that we need to explore. For example, the area of communications. I'm impressed with QuantumLink's *Habitat*, a very interesting product where you become a character within QuantumLink and communicate with other people via modem.

"Success is determined by how well we know our customers. If we understand our customer, the rest is fairly simple."

I also think there are many educational learning-oriented products where people can learn about new and exciting things in a fun way.

Fields: It seems that you are releasing a new product nearly every week. How long can you keep this up?

Cleary: Until my wife tells me I have to go home. No, what really matters to us is the fact that we can do it. We had just a few entertainment titles on the market last year and now there are well over 50 that are very active. And we'll continue coming out with new products regularly.

I remember when we had seven or eight products come out in one week. I don't think we ever want to do that again, we had a good time doing it. (At the mention of that hectic week, colleagues sitting near Cleary muffle their nervous laughter. With a smile that conveyed that he too agreed with their enthusiasm for that week of work, he continued.) We enjoyed eating pizza at four o'clock in the morning. But we have enough really good products on the market now that we don't have to maintain that pace.

Fields: Are you trying to monopolize the software industry?

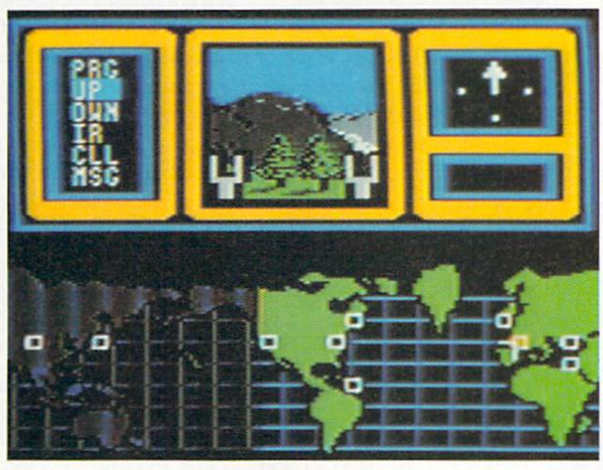
Cleary: No, that's impossible. Competition is good. Competition drives the industry. There's no way one company could monopolize the software industry just as there is no way a single book publisher could monopolize the market for good books. There are six major distributors. We are one of them and we enjoy the competition. Competition is great for the user. It brings the best products at the best price to the market.

But most important today is that software quality, overall, is getting better and better. The difference between today and just a few years ago is like day and night. The products are better and the prices are lower.

Fields: Are prices going to go down or up?

Cleary: We have to maintain support people, and update and support the products. We have one person just to answer the telephone to support our Personal Choice software. I can't envision prices coming down too radically in the productivity area. It still costs a lot of money on the creative side to develop a product, package a product and market a product. You have to make a profit and somewhere along the way you have to pay a lot of bills. I just don't see prices dropping significantly.

You have tremendous start-up cost producing good software, you know, when you include creative development and marketing. I don't see how anybody can do a product for $10. The only good $10 software you are going to see is a mature product where you've already made your money. After that you can afford to drop your price. But then you can't afford to market, you can't afford to advertise or anything. With a new product you have to start with at least $25 to do anything significant.



Fields: Last year you sponsored both a programming contest for users of *GameMaker* and a sizeable rebate program. How did they go over?

Cleary: We gave out over a million coupons good for cash rebates and demo disks, which went over very well. The response was so good, in fact, that we may offer a similar program in the future.

Fields: Has the winner of the contest been named?

Cleary: Yes. The winner was Cleophus Davis. He won $5,000 for a program he called Final Attempt. Hundreds of kids and adults took the time to enter the contest. We're going to produce and release 5,000 copies of Davis's program which buyers of *GameMaker* can purchase for a nominal fee to cover handling and postage.

Fields: I understand there is a funny story related to the contest.

Cleary: Yes. The contest was called the *GameMaker*'s designer contest. And we had a lot of humorous entrants to the contest. But the funniest entrant was from a fellow in a northern province of Canada who did an X-rated product which I can't even mention in mixed company. It wasn't a malicious X-rated product, it was just very, very funny. In fact, I keep it in my top drawer, very close to me. (To prove the point, he pushes his chair back and pulls the desk's top drawer open. After a few moments of shuffling, surfacing papers, postcards and paper clips, he came up with a lone disk. But he did not give me the chance to review it.) It is a shame that someone went to all the trouble to enter the contest with this hilarious product but that we couldn't choose him as the winner no matter how technically correct or well executed the product was. But it was funny.

People are calling us all the time with really wacky sorts of products. I mean entertaining in a humorous way, not that they would be commercially viable.

Fields: While we're on the subject, let me ask you about Infocom's *Leather Goddesses of Phobos*. Is it as risque as the cover suggests?

Cleary: I don't think so. I think it's selling because it's a hot new Infocom title. There is little sex in the game. It's funny—not dirty. I don't think there's a big market for sex in the computer market. People buy Infocom games because they know the company and the quality of their products. Because it has a sexy title, I think it helps.

Fields: How do you see the future of the computer/software industry?

Cleary: Commodore is healthy. The computer market is healthy. This is a very young industry. As long as those two are strong, the software industry will get better and better.

Fields: What about software copy protection schemes? Do they really work? Do they save or cost the software vendor money?

Cleary: We are looking at ways to accommodate the users of mass storage devices (hard disk) who use our creativity and productivity titles. But on the entertainment side of the house, which we call the fiction group of products, we expect to be paid for our products. We try to minimize piracy, which is an on-

Continued on pg. 118

TWO NEW AMIGAS *from Commodore*

Amiga 500: The Ultimate Home Computer

Five years ago, Commodore introduced the Commodore 64 with 64K of RAM and an 8-bit microprocessor at a suggested retail price of $595. This year, Commodore is releasing the Amiga 500—with 512K of RAM, 16-bit microprocessor technology, and true multitasking capabilities—for the suggested retail price of $649.00

The Amiga 500 is a lower-priced, single-component version of the Amiga 1000, similar in appearance to the Commodore 128. It comes standard with 512K of RAM, Kickstart 1.2 on ROM, and a 3½-inch drive built into the right side of the keyboard. The Amiga 500 is software-compatible with all Amiga 1000 software that also runs under Kickstart 1.2.



The ports on the back of the Amiga 500 include an RGB analog video port for a color monitor along with a monochrome composite port. An external disk drive port allows you to add up to two external 3-1/2 inch drives in addition to the internal drive. RS-232 (serial) and Centronics (parallel) ports let you use modems, printers and any other devices conforming to these standards. The ports are industry standard in both gender and pinouts so that standard cables can be used to connect devices. There are also left and right RCA audio ports that can be plugged into either the monitor or your stereo system.

The left side of the keyboard has a knock-out panel to reveal a full 86-pin Amiga system bus. This bus can be used to add external RAM to the system (up to eight megabytes) or to connect peripherals such as hard drive controllers and video digitizers.

On the bottom of the case is a small external slot (much like the front port on the Amiga 1000) for which Commodore plans to make a 512K expansion card with a real-time battery-backed clock. This is considered internal memory expansion, and allows your Amiga 500 to be expanded to nine megabytes of total RAM.

Expansion RAM on the Amiga is treated as directly accessible, contiguous memory. This means that no special commands are needed to use the extra RAM, and no limitations are placed on how much of it a program can use. It is conceivable that you could write a two- or three-megabyte AmigaBASIC program!

Power for the Amiga 500 is provided by an external power supply (again very similar to the 128) with an on/off switch. The power plugs into the back of the keyboard. Two mouse/joystick/lightpen ports are also available on the back of the keyboard. A two-button mouse comes with the Amiga 500 and standard Commodore-style joysticks can be used when a game calls for one.

The keyboard itself is a 94-key, expanded version of the Amiga 1000 keyboard. Some of the new additions to the keyboard include a full numeric keypad with plus, minus, multiplication, division and parenthesis symbols; a "T" style cursor pad with two special function keys that operate similar to a mouse; and an IBM-style layout for the remainder of the keyboard, including IBM designations on the numeric keypad.

One of the most widely discussed features of the Amiga 1000 is its graphics capabilities—and the Amiga 500 has all of the same screen resolutions, with the same palette of 4,096 colors. In the low-resolution modes (320 X 200 or 320 X 400 pixels), 32 colors are available out of the palette. In the medium- (640 X 200 pixels) or high-resolution (640 X 400 pixels) modes, 16 colors are available. Each program running on the Amiga can be using its own resolution and color set, independent of any others that may be running.

Although the low-resolution is the same as a Commodore 64, graphics on the Amiga 500 have a perceived resolution that can be much higher. Imagine drawing a seascape with 32 shades of blue and green, or a sunset with 32 reds, oranges and purples!

The Amiga 500 also provides very powerful audio control. Four channels of sound are available, each of which can contain multiple voices. The channels can modify (modulate) each other, allowing some very complex musical sounds. The custom sound chip is capable of reading through and playing an entire waveform or digitized sound without any control from the 68000 microprocessor. With four or more voices, complex waveforms and digital sounds, and left and right audio output, the Amiga 500 is capable of some tremendous music.

Commodore® AMIGA® 500

by Jim Gracely
Technical Editor

Commodore is expanding the Amiga line of computers this year with two new entries—the Amiga 500 and the Amiga 2000—both of which rely on the Amiga 1000 technology and are compatible with version 1.2 software. However, the Amiga 500 is a cost reduced, smaller unit and the Amiga 2000 is an open-architecture, fully expandable machine.

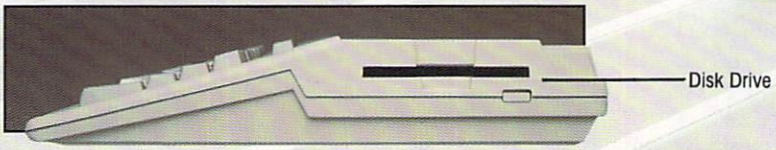
Technical Editor Jim Gracely takes a quick look at each of these outstanding new computers.

Like the Amiga 1000, the Amiga 500 is a true multitasking computer. While the 68000 microprocessor running at eight megahertz provides the main processing power, four custom chips handle most control of the graphics, audio, animation, input/output, memory management and peripherals. All of this co-processing allows the Amiga 500 to multitask. This means that more than one program (referred to as tasks) can be running on the computer at one time. The programs are all active at once, with no degradation in the speed of any of the programs. Although the Amiga and many other computers offer windows, having multitasking capability is quite different. Multitasking is important to understand, and is why the Amiga line of computers competes with computers costing many times more.

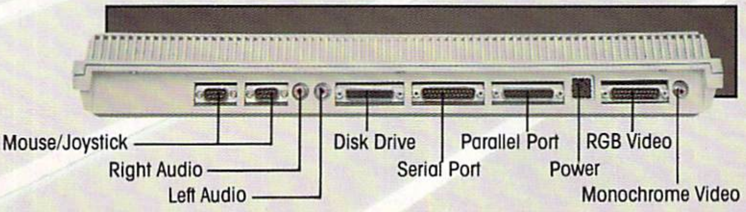
In essense, the Amiga 500 now provides the home computer user the opportunity to experience the power of the Amiga—without having to sacrifice features.



SIDE VIEW



REAR VIEW



Amiga 2000: Gateway to the Future

In the same year, Commodore has announced the Amiga 2000, a computer which will excite the many Amiga- and IBM-compatible computer users. It is a flexible, open-architecture computer which comes standard with one megabyte of RAM, a 3½-inch drive and a total of 11 expansion slots.

The Amiga 2000 is about the size of the Commodore PC-10 with a single built-in 3½-inch drive. Space and brackets are provided for one additional 3½-inch and 5¼-inch floppy or hard drive.

On the rear of the Amiga 2000 are almost all the same ports as the Amiga 1000. There is an RGB analog video port for a color monitor and an external drive port that allows you to add a stand- alone drive along with the internal units. The RS-232 (serial) and Centronics (parallel) ports have been changed to match industry standard gender and pinouts and provide compatibility with a large range of modems and printers. Two RCA audio ports provide the left and right unamplified audio that can be connected to a monitor or stereo.

The one megabyte of RAM built in translates to more than double the capacity of the Amiga 1000. The first 512K block of RAM is referred to as chip RAM and is available for all of your windows, screens and graphics. All RAM beyond 512K is considered fast RAM because it is accessed exclusively by the microprocessor. On a one megabyte Amiga, all of your programs and data are stored in the second bank of 512K RAM. This leaves an entire 512K of RAM available for graphics. The result is that more programs can run with more windows and graphics—simultaneously.

Internally, the Amiga 2000 has a lot of open space. To the left of the drives are five Amiga expansion slots. These are full-size Amiga slots which will accept any Amiga expansion cards. Commodore has plans to release three cards for these slots. Two cards are for memory expansion—a two-megabyte expansion board populated as a one or two megabytes and an eight-megabyte expansion board populated as four or eight megabytes.

The third card is a hard drive controller card. This very flexible card has two IBM-standard ST506 hard drive ports, one MAC-style 25-pin SCSI (small computer system interface) port and a 50-pin ribbon SCSI port. The SCSI devices currently available are very fast, very big hard drives (up to 300 megabytes) and optical drives (up to 2,000 megabytes). On the horizon are laser printers, CD ROMs and tape drives.

The Amiga 2000 also contains two other Amiga expansion slots. A CPU expansion slot is located between the five Amiga slots and the drives. It is a standard Amiga 86-pin connector which allows you to add a 68020 board, math coprocessor (68881) or other CPU-related expansion. The other slot, called the video expansion slot, is in the back right corner. Commodore is planning to produce an inexpensive composite video card for this slot. A genlock card would also use this slot, as well as any other video-related expansion.

Above and to the left of the five Amiga expansion slots are four full-size IBM PC/XT-compatible expansion slots with the two right slots overlapping the two left-most Amiga slots. These two overlapped slots are the places for a very special board from Commodore called the Bridgeboard. This board effectively bridges the MS-DOS and Amiga sides of the computer (physically and theoretically). The Bridgeboard is more than just a card—it is actually almost an entire IBM PC/XT-compatible computer on a board. It contains an 8088 processor running at four megahertz, 512K of RAM and MS-DOS BIOS.

With the Bridgeboard installed, the entire range of MS-DOS software and related hardware becomes available to the Amiga user. The Bridgeboard may go into either of the two overlapping slots leaving either three PC and three Amiga slots, or two PC and four Amiga slots. This is user-selectable and user-changeable.

Cards that can be installed in the remaining PC slots include multifunction cards, hard disk controller cards, hard drive cards, and LAN (local area network) cards.

The Amiga treats the MS-DOS side of the Amiga 2000 as a single task running in a single window. You can multitask an MS-DOS program such as **Lotus 1-2-3** at the same



The Bridgeboard allows the Amiga 2000 to be IBM PC/XT-compatible.

Commodore AMIGA 2000

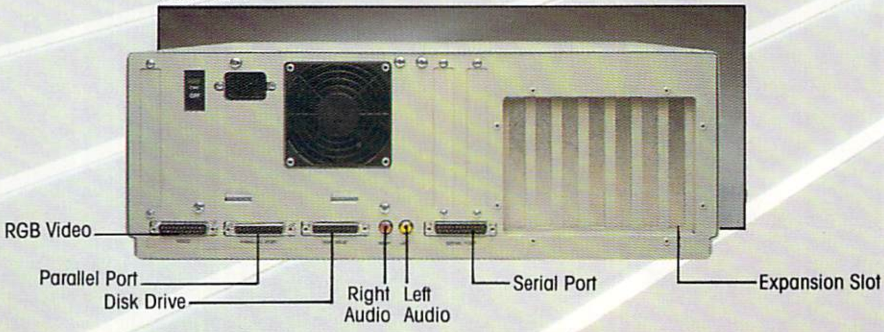
time you are running **Aegis-Draw** and **Superbase**. All three would be running simultaneously. In fact, the MS-DOS side of the computer is running even when its window isn't open. In other words, you could set up a large database application, start it running, and close the window. After continuing with your other work, you could re-open the MS-DOS window and check on the progress.

Other features of the Amiga 2000 include a real-time, battery-backed clock, Kickstart 1.2 in ROM, a new 94-key keyboard with a full numeric keypad, a "T" style cursor pad, and IBM PC/XT designations on the front of all applicable keys. The Amiga 2000 can be internally expanded to nine megabytes of contiguous RAM, and a hard disk or drive card on the MS-DOS side can be partitioned and shared between both sides of the computer.

The Amiga 2000 successfully keeps the powerful graphics, sound and multitasking of the Amiga 1000 while adding optional compatibility with MS-DOS hardware and software in a flexible, open-ended machine.



REAR VIEW



Big Name Hunting in America, Part 2

Exploring the Licensing Jungle

In part one of this two-part look at the "licensing phenomenon" in software, we learned how software companies license copyrighted characters like Mickey Mouse™ and G.I. Joe™. In this part, we meet additional individuals in the software community who offer some amusing insight into the world of licensing.

by John Jermaine

Artworx Rejects *Dukes of Hazzard*

Why would a company avoid licensing? I spoke to Arthur Walsh, president of Artworx Software, Bruce Carver, president of Access Software, and Glenn Tourville, creator of the game *Hangman Roulette*, to learn some reasons for steering clear of copyrighted characters.

Jermaine: Why has your company stayed away from licensing ventures?
Walsh: About three years ago, Artworx considered licensing *The Dukes of Hazzard* title for our *Hazzard Run* program. The license was practical because of the popularity of the television program, but you have to consider what the market was like at that time. The video cartridge game epidemic had just ended, leaving the microcomputer game people holding the bag. Many of the cartridge games featured licensed themes, and, unfortunately, most of them had very shallow concepts. The release of a licensed program at that time would have automatically smacked of rip-off, and we would have lost many potential customers on that basis alone. We also felt that the price of the license was unrealistic, considering how small the software market was at that time. *The Dukes of Hazzard* was the only licensed title we have ever seriously looked at.
Carver: Access Software has differing opinions when it comes to licensing a character or theme for a software project. Personally, I view a license when it's used in conjunction with software to be a marketing ploy. I want a program to be able to stand on its own merit. Other individuals in the company, however, believe that licensing is great, so as you can see, we don't have a definite policy on the matter.



At one time, Access was very interested in *The A-Team* license because it was the hottest show on television. Before we could get down to negotiating a contract for that property, Atari beat us to the punch and bought the rights to that title. To date, though, none of us have seen any evidence to indicate that *The A-Team* title is being used anywhere in the microcomputer industry. We don't understand why a company would buy a strong, expensive title like *The A-Team* and then just sit on it.

Jermaine: What is the story behind *Hangman Roulette*?

Tourville: I decided to develop *Hangman Roulette* because of the tremendous popularity of the television game show *Wheel of Fortune*. Both *Hangman Roulette* and *Wheel of Fortune* are based on the old hangman game. The concept of hangman has been around for years.

However, I felt that the Wheel of Fortune board game was disappointing. It had less than 100 puzzles and was difficult to set up and play. Despite this, the board game was a big success. Since Merv Griffin had put it on television, I thought Merv Griffin Enterprises would be interested in a computer version of hangman, especially since a computer overcomes the weaknesses of the board game. *Hangman Roulette* has over 500 puzzles, with the option to make up your own. It is also easy to play.



I approached Merv Griffin Enterprises about a possible joint venture in December of 1985. At that time, the game had the *Wheel of Fortune* theme song and was packaged under the *Wheel of Fortune* name. They turned me down cold.

But instead of shelving the project, I dropped the theme song and changed the name of the program to *Hangman Roulette*. Six months later, I introduced the product at the 1986 Chicago Consumer Electronics Show. Even with the changes, people still call it *Wheel of Fortune*.

Scott Adams and Marvel Comics

But on the whole, it seems that the pros outweigh the cons in the scramble to license hot characters, as illustrated by my discussion with Scott Adams, president of Adventure International.

Jermaine: During recent years, Adventure International has purchased the rights to several licensed properties. What can you tell me about these?

Adams: Several years ago, Marvel Comics approached us to write adventure games featuring many of their famous characters including The Hulk™ and Spider Man™. Some of the people at Marvel were fans of my previous adventure programs, so they reasoned I could do some



interesting things with their characters. I had also been a fan of Marvel Comics from my childhood days and continue to read them today.

Once our people had met a couple of times to talk over the issues, a handshake agreement was reached until the papers could be signed. Marvel gave me total freedom to do what I wanted with their characters, but my first idea for the series of programs caught them a bit off-guard. They admitted that my concept was exciting and had a lot of possibilities, except they were about to release a comic book series called *The Secret Wars* that did exactly what I had in mind. So I went back to the drawing board and came up with *Questprobe*, a series of games that were loosely connected by a central story and which existed in the Marvel universe.

Some time later, we were contacted by the people who owned the rights to the *Buckeroo Banzai* movie. I looked things over, came up with some ideas for a game, and we bought the license. I remember the first time I watched the film from the video tape they had sent to us. It took me four showings to figure out exactly what was going on in the movie. Even though I had a lot of fun writing the *Buckeroo Banzai* program, the film did poorly at the box office, so consequently the game didn't sell well either.

We wrote a graphics adventure game based on the *Gremlins* movie and sold it in England. But since another company owns the rights to that property here in the United States, the possibility of it being released on the American market is very slim.

Ghostbusters Succeeds for Activision

Activision is another software company with a strong licensing background. Dick Lehrberg is the Vice President of Product Acquisition for Activision, and he has held that title for four years. Along with David Crane, programmer of *Ghostbusters*, he talked of his experiences.

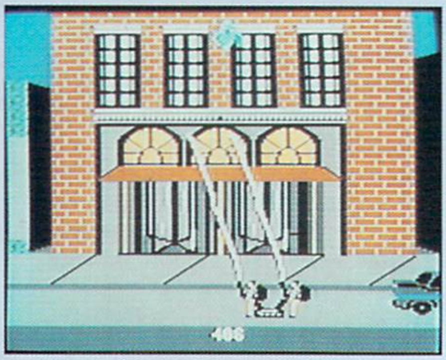
Jermaine: In recent years, has Activision had any licensing ventures that didn't work out?

Lehrberg: Yes we did. In one case, the creator of a licensed property would not allow his creation to be translated into software. That occurred in 1984, when there were a number of negative articles circulating around about the home computer business. This individual simply didn't want to be associated with a "failing" industry. Another time, the business agents for an extremely popular entertainment star were asking for an outrageous financial arrangement in order for us to use his work. These are examples of what we go through.

Electric Dreams, an English branch of the Activision family tree, recently released a program called *Back to the Future*. It contains many of the elements present in the hit Steven Spielberg film of the same title. We won't be releasing that product here in the United States for a very good reason. The movie was released in the United Kingdom six months later than it appeared in the American theaters. This gave Electric Dreams the opportunity to see the value of the title before the movie actually reached England. In our case, we felt that the subject was too old to do well on the American software market.

Jermaine: Can you tell us about the development of *Ghostbusters*?

Lehrberg: *Ghostbusters* appealed to us for several reasons. It was a very popular movie, the subject was original, and the basic story itself provided a number of interesting elements for David Crane to work with. Columbia Pictures also contributed a great deal to the project. They



were very strict when it came to approving our ideas for the program, but they worked closely with us throughout the entire project. Once the initial story boards were completed, the rest of the approvals were fairly routine. There were no last minute changes in our game concept.

Crane: *Ghostbusters* was a strange project. At the time, I was in the process of creating an animated city-wide adventure. The player would be able to drive a vehicle, use a map to plot his way, and add equipment to the car to give it special capabilities. This program might have evolved into a James Bond-type of game if *Ghostbusters* hadn't come along.

Anyway, I had worked on this concept for several months when I took a night off to see *Ghostbusters* at a local movie theater. I really enjoyed the film. A day later, I went to work and ran into one of the people from our acquisition group. He asked me if I'd be interested in doing a *Ghostbusters* computer game.

Now, I was truly interested in the project, but they wanted it to be completed by the end of August so the game could be released before Christmas. This was May of 1984, which gave me approximately ten weeks to develop the program. Normally I couldn't possibly program a game in that amount of time, but

Continued on pg. 120

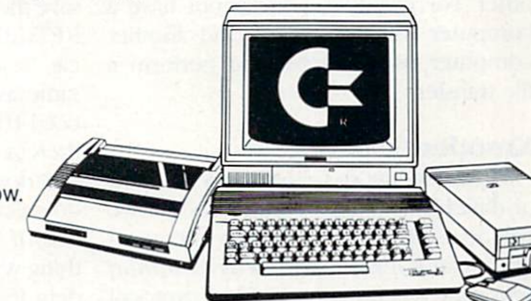
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SM

There is a communications surcharge for connection to Q-Link from Canada: 6 cents (U.S.) from Montreal, Vancouver, Ottawa, Toronto and Calgary. 15 cents (U.S.) per minute from over 85 other locations.

from them) that includes their protocol for file transfer. The important thing to remember about all these protocols is that they are not compatible with each other. For example, you cannot have a computer using Xmodem and another computer using Punter and perform a file transfer.

Xmodem example

Downloading or uploading is not hard or difficult with any of the protocols. We will be using Xmodem here in our example because it is supported by *Common Sense* and it is the most popular protocol available. Since there are versions of Xmodem for almost every computer, you should be able to find a BBS or commercial data base that offers Xmodem file transfers. In fact, with Xmodem you can upload a program from a Commodore to an Apple, download it to a IBM, upload it to a TRS-80 and then download it to a Commodore with the program running just like it did when it was uploaded to the Apple.

In order to use Xmodem, you will have to call and log onto a system that supports Xmodem file transfers. Then go to the file transfer area, an area where all uploads and downloads are done, and select the option to upload or download. For the first example we will download, so select the file to download. Each commercial system and BBS will have a different way of entering the file transfer area and selecting the file you want to transfer. Check with the system operator for full details on how to perform these items on their system.

Now that we have selected the file we want to download, the system will display a message similar to "Ready for Xmodem transfer" or "Ready to Send." At this point, the sending computer is ready and waiting to send the requested file. The host system will normally wait up to 1½ minutes for you to start the transfer. You start the transfer by pressing the Commodore key and X.

The second line up from the bottom will now change and you will see "(S)end or (R)eceive." Press the R key. This because we want to receive a file down to our system. The line will now change to "(P)rogram or (S)equential." This is referring to the type of file we are going to download. If you don't understand the different types of Commodore files, refer to your disk drive manual.

Select the proper choice, P or S, and the line should change once again. This time the line will read "WRITE FILE NAME: 0:comm.data." The cursor is over the C. Now type in the name you want to save the file under on your disk and press RETURN when finished. The filename can be any name you choose, but not the same as one already on the disk or exceed 16 characters. Be sure to check that there is enough free space on the disk for the download file. The safest way to download is to use an empty formatted disk. If your formatted drive and everything with the filename is OK, the Xmodem transfer will begin. Once the transfer begins, everything is automatic. When the transfer is finished, *Common Sense* will return you to the terminal mode.

Now let's try an upload. Again you will have to call and go to the file transfer area of the service you are calling. After selecting to upload, most systems will ask for the name and file type of the file you're sending. Enter the information and the system should give you a prompt for uploading, something like "Waiting for Xmodem Receive" or "Ready to Receive." Now press the Commodore key and X. You will see "(S)end or (R)eceive." Press the S key. This is because you want to send a file up to the other system or upload.

The line will now change to "(P)rogram or (S)equential." This is referring to the type of file you are going to upload. Select the proper choice, P or S, and the line should change once again. This time the line will read "READ FILE NAME: 0:intro.scr." The cursor is over the I. At this prompt, type in the name of the file you want to send exactly like it appears on your disk and press RETURN. If the file is found and it is of the file type you selected, the transfer will automatically begin. When the upload is finished, you will be returned back to the terminal mode.

You can see just how easy file transfers really are. As with most other things, the more you do it the better you will become. After a while, file transfers will be second nature.

In the next two installments, we will answer the most frequent questions sent to us. Please keep in touch! ■

Suzanne McCoach is Telecommunications Manager at Commodore. Dan Schein is Network Coordinator.

Continued from pg. 58

+ + +ATZ [RETURN]
+ + +ATA [RETURN]

Once the computers and modems are connected in either fashion, you can then use the terminal programs to transfer files from one system to the other.

Xmodem is an error-correcting protocol that is used by terminal or telecommunication programs, and is similar to Punter or Kermit protocols. It is highly recommended that Xmodem be used for transferring files between systems to insure the transfers are error-free. Several programs in the public domain include Xmodem support and most commercial Amiga software also has this option.

All of the files you'll find in the Amiga download libraries are 64/128 sequential files when downloaded. They should be transferred to your Amiga with no translation between the two computers. If done this way, ASCII text files will be Amiga-compatible—meaning upper-and lower-case will be reversed and there will be no carriage returns (only line feeds) at the end of each line. If needed, these files can be read or printed on your 64/128 with a special program that is available in the Amiga Utilities library.

Most of the files that have been uploaded to the Q-Link Amiga libraries, with the exception of ASCII text files, are normally processed through an ARC utility. The ARC utility is used to combine several files into one file for easier data transfer. It also compresses the final file to conserve space and transfer times. All files available processed by the ARC utility have a .arc suffix to identify them.

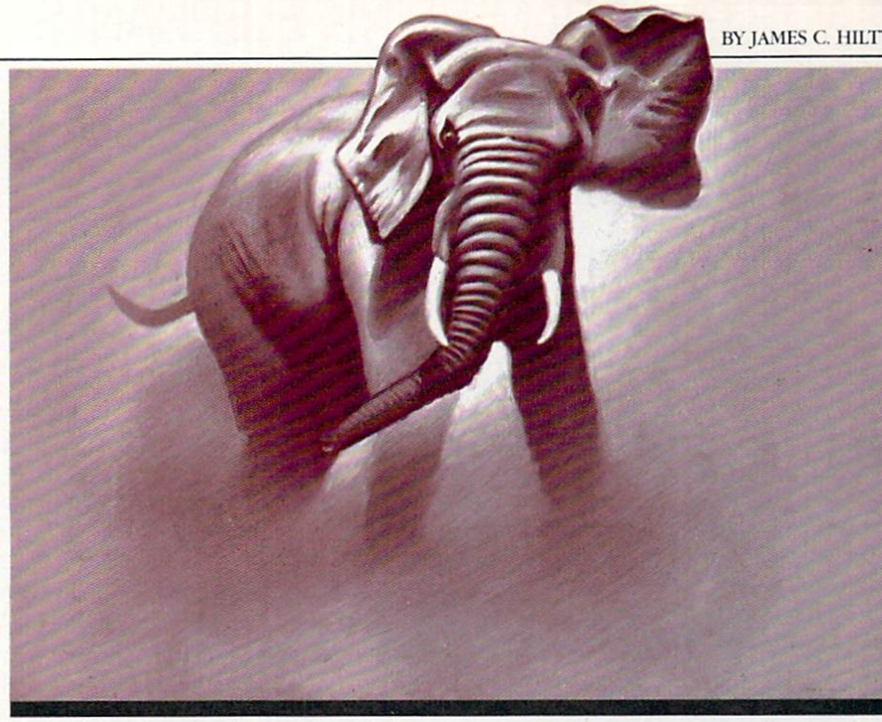
The Amiga .arc files downloaded from Q-Link are saved on your 64/128 disk as normal sequential data files. They're transferred to your Amiga as outlined above. The Amiga ARC utility must then be used to extract the original files from the downloaded file once it's been transferred to your Amiga. Do not attempt to process the files on your 64/128 with an ARC program on that system.

Once you've tried downloading Amiga files and are successful, the entire process can be reversed to upload files as well. Why not share the fruits of your labor? ■

Bob Baker is in charge of the New Products Information area on the QuantumLink network. He can be reached on Q-Link via E-Mail addressed to RBAKER.

BY JAMES C. HILTY

Pink Elephants
for the Commodore 64



BRUCE WEINSTOCK

You and a friend are on a safari when you stumble on a gigantic herd of rampaging elephants. Your friend becomes trapped and you realize that it is up to you to rescue him. Suddenly you notice that there is something strange about this herd of elephants—pink elephants are floating in and out of the herd. Saving your friend is going to be very dangrous indeed.

Pink Elephants is a fast-action strategy game. It uses the many graphic capabilities of the 64, such as multicolor sprites and complex characters. Machine-language routines and an interrupt routine are also used.

After the title screen is displayed, the playing screen is drawn with you at the bottom left of the screen in a safe area. Your friend is at the upper right of the screen. You must get to your friend while avoiding the elephants, including the pink ones. A joystick in port one allows you to move up, down, left or right. However, once you start moving in one direction, you keep moving in that direction until you change directions with your joystick.

Hitting any of the elephants causes you to lose one of the five men you start the game with. When you lose all five men, the game is over. A bonus clock keeps counting down. If the clock reaches zero, the game is over. You receive 100 points plus the bonus points each time you rescue your friend.

Rescuing your friend is fairly difficult. You must study the different directions parts of the herd are moving, and at the same time you must be lightning-quick on the joystick.

An interrupt routine moves the sprites and gives you control of the joystick through the use of flags. A machine-language routine accessed through SYS49152 moves the elephant herd in different directions. The spacing between the elephants allows just enough room for your player to get through. It probably will take you some practice before you are able to rescue your friend, but after a while you should be zooming right through the herd.

The character set is moved from the 2K block to the 14K block with characters 36-44 redrawn to form the elephant. Some of the elephants are sprites and some are complex custom characters. The sprites and custom characters form elephants which look the same, so you cannot differentiate the sprites from the custom characters. Each character elephant is made up of nine single custom characters to form one complex custom character. Look at lines 840-844 in the program. When you print the characters $, %, &, ', (,), *, + and , you are actually putting an elephant on the screen. All of the other text characters were copied in the 14K block to look exactly as they do in the 2K block.

A wise player would do well to study the movement of the elephants before moving. On the other hand, a carefree player may get lucky and rescue his friend. Either way, I'm sure this game will have you seeing pink elephants after a while! C

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Pink Elephants

```
10 PRINT"[CLEAR,DOWN8]PLEASE WAIT
   WHILE WE TRY TO LOCATE"'BANH
20 PRINT"THE ELEPHANT HERD."'BAHD
25 V=53248:S=54272:M=5:B=2500
   :SC=0'FBBM
34 CH=14336:RM=38912'CPHH
36 POKE 53272,(PEEK(53272)AND 240)OR
   14'EUJL
38 POKE 56334,PEEK(56334)AND 254
   :POKE 1,PEEK(1)AND 251'GABP
40 FOR I=CH TO CH+511:POKE I,
   PEEK(I+RM):NEXT'IREJ
42 POKE 1,PEEK(1)OR 4:POKE 56334,
   PEEK(56334)OR 1'GVXK
44 FOR I=CH+8*36 TO CH+8*45 STEP 8
   :FOR J=I TO I+7:READ N:POKE J,N
   :NEXT:NEXT'QANT
45 FOR X=50880 TO 51116:READ A
   :POKE X,A:NEXT'GSIM
46 FOR X=49152 TO 49528:READ A
   :POKE X,A:NEXT'GSWN
48 FOR X=12288 TO 12542:READ A
   :POKE X,A:NEXT'GSIP
50 GOSUB 800'BDLC
52 GOSUB 750'BDPE
54 GOSUB 600'BDJG
56 GOSUB 650'BDOI
57 POKE V+21,255:GOSUB 750
   :POKE 50432,191:SYS 51104'FCQQ
58 W1=PEEK(V+30):W2=PEEK(V+31)'GPFQ
```

```
59 REM    MAIN LOOP'BIMM
60 POKE 49525,3:POKE 49526,20'CQDG
61 POKE 49522,3:POKE 49523,6
   :POKE 49524,8:SYS 49152'EEEL
63 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDM
64 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKN
65 GOSUB 104'BDII
66 POKE 49522,4:POKE 49523,12
   :POKE 49524,14:SYS 49152'EGUQ
68 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDR
69 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKS
70 GOSUB 104'BDIE
71 POKE 49522,3:POKE 49523,18
   :POKE 49524,20:SYS 49152'EGWM
73 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDN
74 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKO
75 GOSUB 104'BDIJ
76 POKE 49522,4:POKE 49523,24
   :POKE 49524,26:SYS 49152'EGBR
78 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDS
79 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKT
80 GOSUB 104'BDIF
81 POKE 49522,3:POKE 49523,30
   :POKE 49524,32:SYS 49152'EGTN
83 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDO
84 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKP
85 GOSUB 104'BDIK
86 POKE 49522,2:POKE 49523,0
   :POKE 49524,38:POKE 49525,1
   :POKE 49526,2:SYS 49152'GVKW
88 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDT
89 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKU
90 GOSUB 104'BDIG
91 POKE 49522,1:POKE 49525,21
   :POKE 49526,23:SYS 49152'EGVO
93 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDP
94 W2=PEEK(V+31):IF W2>127 THEN
   150'GQKQ
95 GOSUB 104'BDIL
96 B=B-10:IF B=0 THEN 200'FKYQ
97 PRINT"[HOME,CYAN]"TAB(23)"[SPACE5]"
   :PRINT"[HOME]"TAB(23);B'EJBR
99 W1=PEEK(V+30):IF W1>127 THEN
   110'GQDV
100 W2=PEEK(V+31):IF W2>127 THEN
    150'GQKC
101 GOSUB 104'BDIW
102 GOTO 60'BCNW
103 REM    JOYSTICK'BIEA
104 JY=PEEK(56321)AND 15'DLAD
105 IF JY=7 THEN POKE 50447,1
    :POKE 50448,0:POKE 50688,128
    :RETURN'HEHK
106 IF JY=11 THEN POKE 50447,255
    :POKE 50448,0:POKE 50688,128
    :RETURN'HHHL
107 IF JY=13 THEN POKE 50447,0
    :POKE 50448,1:POKE 50688,128
    :RETURN'HFCM
108 IF JY=14 THEN POKE 50447,0
    :POKE 50448,255:POKE 50688,128
    :RETURN'HHKN
109 RETURN'BAQE
110 REM    SPRITE COLLISIONS'BQAB
112 IF W1>191 THEN 120'DICB
114 GOTO 150'BDFB
120 REM    SAVE HEROINE'BLYA
122 POKE 50447,0:POKE 50448,0
    :POKE 50688,128:POKE 50432,0'EIVH
124 GOSUB 750'BDPC
126 SC=SC+100+B:PRINT"[HOME]"TAB(9);
    SC'FORJ
128 POKE V+16,96:POKE V+14,48
    :POKE V+15,200'GVQN
130 GOTO 54'BCQX
150 REM    CHARACTER COLLISION'BSYF
151 POKE 50447,0:POKE 50448,0
    :POKE 50688,128'DADH
152 POKE 50432,0:POKE 2047,193'CQMG
154 FOR X=0 TO 24:POKE S+X,0:NEXT'GKDK
156 POKE S+24,143:POKE S+5,16
    :POKE S+19,16:POKE S+6,252
    :POKE S+20,249'KKBT
158 POKE S+4,21:POKE S+18,17
    :POKE S+1,68:POKE S+15,42
    :FOR I=1 TO 200:NEXT'MHOW
160 POKE S+4,20:POKE S+18,16
    :FOR I=0 TO 400:NEXT'ITYJ
162 FOR X=0 TO 24:POKE S+X,0:NEXT'GKDJ
164 M=M-1:PRINT"[HOME]"TAB(35);M
    :IF M=0 THEN 200'HPVM
165 FOR T=0 TO 250:NEXT'EGXJ
166 POKE V+16,96:POKE V+14,48
    :POKE V+15,200:POKE 2047,192'HFSR
170 POKE 50432,191:GOTO 58'CMOF
200 REM    GAME OVER'BIDX
201 POKE 50447,0:POKE 50448,0
    :POKE 50688,128'DADD
202 POKE V+21,0:PRINT"[CLEAR]"'DGNB
204 PRINT"[DOWN8]"TAB(11)"G A M E
    [SPACE3]O V E R":PRINT"[DOWN]
    "TAB(14)"PLAY AGAIN?"'EHYK
206 PRINT TAB(16)"Y OR N"'CDMF
208 PRINT"[DOWN4]"TAB(17)"SCORE"
    :PRINT TAB(18);SC'EKGK
210 GET JUNK$:IF JUNK$<>""THEN
    210'FOMD
212 GET A$:IF A$=""THEN 212'EIED
214 IF A$="Y"THEN 220'DFEE
216 POKE V+21,0:END'DGQG
```

PINK ELEPHANTS

```
220 POKE V+21,0:PRINT"[CLEAR]":SC=0
    :M=5:B=2500:GOTO 50'HWYH
600 REM     SETUPS'BGOC
602 POKE 49525,3:POKE 49526,20'CQDG
604 FOR X=39 TO 44:POKE V+X,10:NEXT
    :POKE V+45,7:POKE V+46,5
    :POKE V+37,10'MGRS
606 POKE V+38,9:POKE V+28,192
    :POKE V+0,96:POKE V+1,82
    :POKE V+2,96:POKE V+3,178'MNMW
608 POKE V+4,144:POKE V+5,122
    :POKE V+6,192:POKE V+7,146
    :POKE V+8,240'KJQV
610 POKE V+9,17:POKE V+16,96
    :POKE V+10,5:POKE V+11,104
    :POKE V+12,33:POKE V+13,76'MPGR
612 POKE V+14,48:POKE V+15,200
    :FOR X=2040 TO 2045:POKE X,195
    :NEXT:POKE 2046,194'KPDR
614 POKE 2047,192:POKE V+27,63
    :POKE 50433,0'EXNM
618 POKE 50434,2:POKE 50435,255
    :POKE 50436,0:POKE 50437,0
    :POKE 50438,253'FSLU
620 POKE 50439,0:POKE 50440,3
    :POKE 50441,0:POKE 50442,254
    :POKE 50443,1'FQVN
622 POKE 50444,0:POKE 50445,0
    :POKE 50446,0:POKE 50447,0
    :POKE 50448,0:RETURN'GPAP
650 REM     PLAYING SCREEN'BNXJ
652 PRINT"[CLEAR,SPACE3,CYAN]SCORE ";
    SC;TAB(17)"BONUS ";B;
    TAB(31)"MEN ";M'DPTS
654 PRINT"---------------------------
    ------------"'BAEQ
655 PRINT"-[L. RED]PINK[CYAN]--
    [L. RED]ELEPHANTS[CYAN]--[L. RED]
    PINK[CYAN]--[L. RED]ELEPHANTS
    [CYAN]--[L. RED]PINK"'BAPB
656 PRINT"[GRAY2]$%&[SPACE3]$%&
    [SPACE3]$%&[SPACE9]$%&[SPACE3]$%&
    [SPACE3]$%&"'BAAR
657 PRINT"'()[SPACE3]'()[SPACE3]'()
    [SPACE9]'()[SPACE3]'()[SPACE3]
    '()"'BABS
658 PRINT"*+,[SPACE3]*+,[SPACE3]*+,
    [SPACE9]*+,[SPACE3]*+,[SPACE3]*+,
    "'BAFT
659 PRINT"[CYAN]$%&[SPACE9]$%&[SPACE3]
    $%&[SPACE3]$%&[SPACE9]$%&"'BAOU
660 PRINT"'()[SPACE9]'()[SPACE3]'()
    [SPACE3]'()[SPACE9]'()"'BAAM
661 PRINT"*+,[SPACE9]*+,[SPACE3]*+,
    [SPACE3]*+,[SPACE9]*+,"'BATN
662 PRINT"[GRAY2]$%&[SPACE3]$%&
    [SPACE9]$%&[SPACE9]$%&[SPACE3]
    $%&"'BAHO
663 PRINT"'()[SPACE3]'()[SPACE9]'()
    [SPACE9]'()[SPACE3]'()"'BAAP
664 PRINT"*+,[SPACE3]*+,[SPACE9]*+,
    [SPACE9]*+,[SPACE3]*+,"'BATQ
665 PRINT"[CYAN]$%&[SPACE3]$%&[SPACE3]
```

```
     $%&[SPACE3]$%&[SPACE3]$%&[SPACE3]
     $%&[SPACE3]$%&"'BAAR
666 PRINT"'()[SPACE3]'()[SPACE3]'()
     [SPACE3]'()[SPACE3]'()[SPACE3]'()
     [SPACE3]'()"'BADS
667 PRINT"*+,[SPACE3]*+,[SPACE3]*+,
     [SPACE3]*+,[SPACE3]*+,[SPACE3]*+,
     [SPACE3]*+,"'BAQT
668 PRINT"[GRAY2]$%&[SPACE9]$%&
     [SPACE9]$%&[SPACE3]$%&[SPACE3]
     $%&"'BAHU
669 PRINT"'()[SPACE9]'()[SPACE9]'()
     [SPACE3]'()[SPACE3]'()"'BAAV
670 PRINT"*+,[SPACE9]*+,[SPACE9]*+,
     [SPACE3]*+,[SPACE3]*+,"'BATN
671 PRINT"[CYAN]$%&[SPACE3]$%&[SPACE3]
     $%&[SPACE3]$%&[SPACE3]$%&[SPACE3]
     $%&[SPACE3]$%&"'BAAO
672 PRINT"'()[SPACE3]'()[SPACE3]'()
     [SPACE3]'()[SPACE3]'()[SPACE3]'()
     [SPACE3]'()"'BADP
673 PRINT"*+,[SPACE3]*+,[SPACE3]*+,
     [SPACE3]*+,[SPACE3]*+,[SPACE3]*+,
     [SPACE3]*+,"'BAQQ
674 PRINT"[GRAY2]$%&$%&$%&$%&$%&$%&$%
     &$%&$%&$%&$%&$%&$%&"'BABR
675 PRINT"'()'()'()'()'()'()'()'()'()
     '()'()'()'()"'BAPS
676 PRINT"*+,*+,*+,*+,*+,*+,*+,*+,*+,
     *+,*+,*+,*+,"'BABU
680 RETURN'BAQI
750 REM     SOUND'BFYI
754 FOR L=0 TO 24:POKE S+L,0:NEXT'GKJP
756 POKE S+18,128:POKE S,75:POKE S+5,0
     :POKE S+6,240:POKE S+14,12
     :POKE S+15,250'LOSC
758 POKE S+24,207'CHPQ
760 FOR L=0 TO 35:POKE S+4,17
     :POKE S+1,PEEK(S+27)'JTTQ
762 FOR T=0 TO 50:NEXT:NEXT:POKE S+4,0
     :RETURN'IMSQ
800 REM     TITLE SCREEN'BLIF
802 PRINT"[CLEAR]":POKE 53281,0
     :POKE 53280,0'DQOJ
804 GOSUB 840'BDPH
806 GOSUB 840'BDPJ
807 PRINT'BACJ
808 PRINT TAB(16)"[L. RED]P I N K"
     :PRINT TAB(4)"$%&"TAB(32)
     "$%&"'FJYR
810 PRINT TAB(4)"'()[SPACE4]
     E L E P H A N T S[SPACE4]'()"'CCJK
812 PRINT TAB(4)"*+,"TAB(32)"*+,"
     :PRINT:PRINT'FHTK
814 GOSUB 840'BDPI
816 GOSUB 840'BDPK
818 RETURN'BAQL
840 PRINT"[GRAY2]$%&[CYAN]$%&[GRAY2]
     $%&[CYAN]$%&[GRAY2]$%&[CYAN]$%&
     [GRAY2]$%&[CYAN]$%&[GRAY2]$%&
     [CYAN]$%&[GRAY2]$%&[CYAN]$%&
     [GRAY2]$%&"'BAGU
842 PRINT"[GRAY2]'()[CYAN]'()[GRAY2]
     '()[CYAN]'()[GRAY2]'()[CYAN]'()
     [GRAY2]'()[CYAN]'()[GRAY2]'()
     [CYAN]'()[GRAY2]'()[CYAN]'()
     [GRAY2]'()"'BAXW
844 PRINT"[GRAY2]*+,[CYAN]*+,[GRAY2]
     *+,[CYAN]*+,[GRAY2]*+,[CYAN]*+,
     [GRAY2]*+,[CYAN]*+,[GRAY2]*+,
     [CYAN]*+,[GRAY2]*+,[CYAN]*+,
     [GRAY2]*+,":PRINT'CBPB
846 RETURN'BAQM
1006 REM     CHARACTER DEFINITIONS'BUMF
1008 DATA 0,0,0,0,0,3,63,255,0,0,0,0,
     0,255,255,255,0,0,0,0,0,192,192,
     224'BMJN
1010 DATA 253,252,254,207,223,255,252,
     255,255,255,127,63,191,191,63,
     255'BLQG
1012 DATA 240,248,252,252,252,244,244,
     247,255,206,206,206,206,236,0,
     0'BJVH
1014 DATA 255,0,0,0,0,0,0,0,240,112,
     112,112,112,96,0,0'BTIG
1015 DATA 255,255,255,255,255,255,255,
     255'BGAF
1060 REM     SPRITE INTERRUPT'BPAE
1062 DATA 169,255,45,0,198,240,16,169,
     0,141,0,198,162,21,189,0'BCTL
1064 DATA 197,157,0,198,202,208,247,
     162,1,169,1,141,80,197,173,80,
     197'BJBO
1066 DATA 45,0,197,240,3,76,243,198,
     232,232,14,80,197,208,238,76,49,
     234'BLUR
1068 DATA 169,0,29,0,197,208,3,76,97,
     199,169,128,61'BQQP
1070 DATA 0,197,240,48,254,0,198,208,
     40,222,255,207,76,144,199,80'BFXL
1072 DATA 197,45,16,208,208,12,173,16,
     208,13,80,197,141,16,208,76'BFSN
1074 DATA 43,199,173,16,208,77,80,197,
     141,16,208,189,0,197,157,0'BELP
1076 DATA 198,76,97,199,222,0,198,208,
     40,254,255,207,208,29,173,80'BGSR
1078 DATA 197,45,16,208,208,12,173,16,
     208,13,80,197,141,16,208,76'BFST
1080 DATA 91,199,173,16,208,77,80,197,
     141,16,208,189,0,197,157,0'BEOM
1082 DATA 198,169,0,232,29,0,197,208,
     3,76,140,199,169,128,61,0'BCJN
1084 DATA 197,240,11,254,0,198,208,20,
     222,255,207,76,134,199,222,0'BGGQ
1086 DATA 198,208,9,254,255,207,189,0,
     197,157,0,198,202,76,233,198'BGUS
1088 DATA 169,255,221,255,207,240,3,
     76,43,199,173,80,197,76,17,
     199'BGUU
1090 DATA 120,169,192,141,20,3,169,
     198,141,21,3,88,96'BSRK
1192 REM     SCREEN MOVEMENT'BOKJ
1194 DATA 174,114,193,224,3,144,3,76,
     117,192,188,114,193,140,121,193,
     174'BMDT
1196 DATA 118,193,232,202,32,30,193,
```

```
     172,121,193,173,119,193,201,2,
     208,10'BMDV
1198 DATA 169,32,72,173,33,208,72,76,
     50,192,177,90,72,177,92,72,204,
     116'BLVX
1200 DATA 193,240,20,200,177,90,72,
     177,92,136,145,92,104,145,90,200,
     204'BLRH
1202 DATA 116,193,208,238,240,18,136,
     177,90,72,177,92,200,145,92,104,
     145'BMLJ
1204 DATA 90,136,204,115,193,208,238,
     173,119,193,201,0,208,5,104,104,
     76'BLQL
1206 DATA 111,192,104,145,92,104,145,
     90,236,117,193,208,160,96,172,
     116,193'BOCN
1208 DATA 200,189,114,193,170,32,30,
     193,173,120,193,201,2,208,19,136,
     169'BMQP
1210 DATA 32,153,122,193,173,33,208,
     153,162,193,204,115,193,208,239,
     240'BLWI
1212 DATA 16,136,177,90,153,122,193,
     177,92,153,162,193,204,115,193,
     208,240'BOIK
1214 DATA 236,117,193,240,37,202,32,
     30,193,172,116,193,200,136,177,
     90,72'BMUM
1216 DATA 177,92,32,48,193,145,92,104,
     145,90,32,56,193,204,115,193,
     208'BKPO
1218 DATA 234,236,117,193,208,221,240,
     46,202,206,118,193,232,32,30,193,
     172'BOMQ
1220 DATA 116,193,200,136,32,48,193,
     177,90,72,177,92,32,56,193,145,
     92,104'BNQJ
1222 DATA 145,90,204,115,193,208,234,
     236,118,193,208,221,238,118,193,
     232'BMFL
1224 DATA 32,30,193,173,120,193,201,0,
     240,20,172,115,193,136,200,185,
     162'BMTN
1226 DATA 193,145,92,185,122,193,145,
     90,204,116,193,208,240,96,189,89,
     193'BNJP
1228 DATA 133,91,24,105,212,133,93,
     189,64,193,133,90,133,92,96,72,
     152'BJRQ
1230 DATA 24,105,40,168,104,96,72,152,
     56,233,40,168,104,96,0,40,80'BGBJ
1232 DATA 120,160,200,240,24,64,104,
     144,184,224,8,48,88,128,168,208,
     248'BLCM
1233 DATA 32,72,112,152,192,4,4,4,4,4,
     4,4,5,5,5,5,5'BQCJ
1234 DATA 5,6,6,6,6,6,6,7,7,7,7,7,3,
     0,4,0,4,1,1'BOEJ
1240 REM     SPRITE DEFINITIONS'BRLE
1242 DATA 0,60,0,0,52,0,0,20,0,0,16,0,
     0,40,0,0,40,64,0,170,128,2,
     170'BIEM
1244 DATA 0,1,40,0,0,60,0,0,42,128,3,
     40,128,15,160,192,0,0,240'BCVN
1246 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
     0,0,0,0,0,0,0,0'BSMN
1248 DATA 0,0,0,0,0,0,0,0,0,0,0,0,3,0,
     192,15,0,240,2,0,128,0,130,0'BGKR
1250 DATA 0,130,0,0,40,0,0,40,0,0,60,
     0,0,24,0,0,40,0'BRII
1252 DATA 0,40,0,0,40,0,0,40,0,0,16,0,
     0,20,0,0,52,0,0,60,0,0,136'BESM
1254 DATA 160,0,136,160,0,136,128,0,
     168,128,0,168,160,0,136,160,0,
     136,128'BNQQ
1256 DATA 60,136,128,28,136,160,28,
     136,160,12,0,0,40,0,0'BVQP
1258 DATA 40,128,168,8,128,136,8,128,
     136,12,128,136,12,128,168,8,128,
     128'BMMU
1260 DATA 8,128,128,8,168,128,12,168,
     128,60,0,3,255'BQQJ
1262 DATA 128,63,255,192,255,255,224,
     253,255,240,252,255,248,254,127,
     252'BMSP
1264 DATA 207,63,252,223,191,252,255,
     191,252,252,63,252,255,255'BDYP
1266 DATA 244,255,255,244,255,255,247,
     206,0,112,206,0,112'BWOQ
1268 DATA 206,0,112,206,0,112,236,0,
     96,0,0,0,0,0,0,0,0,0'BVRS
```

END

BY BARRY L. IVES

Renumber BASIC

for the Commodore 64

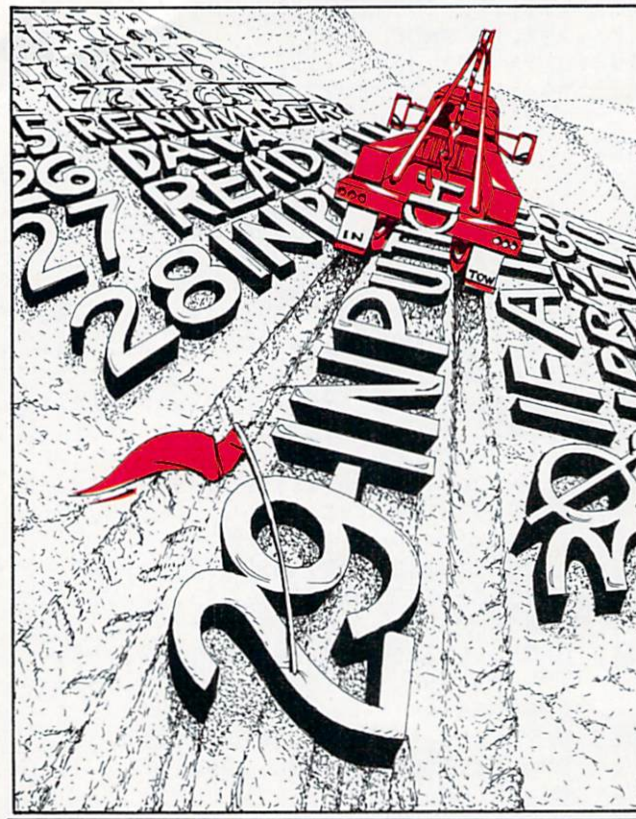
Have you ever found yourself in this frustrating situation—you need to add one or more lines of BASIC between two existing lines, but all the line numbers are numbered consecutively? What do you do? You could go through the lines renumbering them to make space for the new ones, erasing the extra lines that you are now adding, all the while taking the risk of accidently erasing your existing lines. Or you could stick in a GOTO and complete the sequence where there is room, taking the chance of creating a completely unreadable program.

But here's another option. If you have Renumber BASIC residing in RAM, you can type SYS49152, and your entire BASIC program will be renumbered—by tens, twenties or whatever you want. Now you can add those new lines in style. And not only that, when your program is finished, you can renumber again, and all your lines will be equally spaced by whatever margin you choose.

Sound easy? It is! Just type the program into your 64, save it, then run it, entering the spacing and first line number when requested. Then enter NEW to erase the BASIC loader. If you made no errors typing, the machine code is now residing in memory at 49152 ($C000). Use it as often as you like.

If you want to change the spacing, poke the differential (any number from 1 to 255) into 49193 ($C029). To change the number the first line starts with, poke the one you want (again up to 255) into 49161 ($C009). If you want to start with a first line of greater than 255, divide the number by 256, using the integer of the result as the high byte, poking it into 49165 ($C00D). Multiply the decimal remainder by 256 and poke it as the low byte into 49161 ($C009).

That's all there is to it. Remember, though, that you need to change any GOTO's or GOSUB's in the program to go to their respective new lines or you will be in real trouble!



JOHN DZEDZY

Renumber your BASIC program.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Renumber BASIC

```
30 K=Ø:PRINT CHR$(147):PRINT'EJJD
40 INPUT"FIRST LINE NUMBER";A$
   :A=VAL(A$):PRINT'EKDJ
5Ø IF A>255 THEN PRINT"MAXIMUM 255"
   :PRINT:GOTO 4Ø'GIEJ
6Ø INPUT"LINE NUMBER SPACING";B$
   :B=VAL(B$):PRINT'EKIL
7Ø IF B>255 THEN PRINT"MAXIMUM 255"
   :PRINT:GOTO 6Ø'GIHL
8Ø FOR T=49152 TO 492Ø6'DLCI
9Ø READ S:SS=S'CFPH
1ØØ IF S=111 THEN SS=A'EHXY
11Ø IF S=222 THEN SS=B'EHCA
12Ø POKE T,SS'BENX
13Ø K=K+S'CDSA
14Ø NEXT'BAEY
15Ø IF K<>8736 THEN PRINT"ERROR IN
    DATA LISTING.":STOP'GGSL
16Ø DATA 165,43,133,251,165,44,133,
    252,169,111,133,253,169,Ø,133,
    254'BJBM
17Ø DATA 16Ø,3,165,254,145,251,136,
    165,253,145,251,136,177,251,24Ø,
    22'BKXO
18Ø DATA 17Ø,136,177,251,133,251,134,
    252,169,222,1Ø1,253,144,3,23Ø,
    254'BLLP
19Ø DATA 24,133,253,76,16,192,Ø'BWSI
2ØØ PRINT:PRINT " FROM NOW ON,
     TO CHANGE 1ST LINE NUMBER:"'CBAH
21Ø PRINT" POKE 49161,(THE
    NUMBER)."'BABD
22Ø PRINT:PRINT:PRINT " TO CHANGE
    SPACING:"'DCEF
23Ø PRINT:PRINT " POKE 49193,
    (THE SPACING)."'CBWG
24Ø PRINT:PRINT:PRINT " SYS49152 TO
    RENUMBER BASIC."'DCJJ
25Ø PRINT"[DOWN3]":END'CBIC
```

END

BY R. HAROLD DROID

Subliminal Messenger

for the Commodore 64



Flash a subliminal message of your choosing on your computer screen.

Your curiosity may have been aroused by the rumors of the Satanic messages hidden in your rock and roll records. Some say that sinister communication, embedded in seemingly innocuous information, is preying on our subconscious and turning us into zombies. Placed below the threshold of normal perception, these subtle signals pass through the fabric of our consciousness and get stuck in the tar paper underneath.

Now you can conduct experiments in the privacy of your own home and draw your own conclusions about this widely disputed phenomenon. The following program flashes a message of your choosing on your computer screen, too fast for the conscious human brain to resolve. You can use this program to convince your subconscious that it's time to stop smoking, overeating, or whatever. The possibilities are endless.

Load Subliminal Messenger and run it. First you're prompted for border, screen and text color codes for your subliminal message. These default to the colors currently displayed by the system. The next prompts are for timing values. The first value is the interval between flashes, the second is the length of each flash. These are in sixtieths of second. Default values are set for a flash every second, lasting a sixtieth of a second.

You can use longer duration times to adopt the program for purposes other than preying on the subconscious. For instance, you could incorporate this into a BASIC program and use it to flash a message to the user, like "INSERT DISK NOW." The longer duration times are also useful for verifying that the program actually does something.

Enter your message at the prompt. I won't offer suggestions. The only limits are 38 characters, your imagination, and your morals.

If all goes well, the screen flickers slightly as the machine switches between the BASIC screen and the alternate screen (which, by the way, is under one of the ROMs). The flashing message is obvious when contrasted with a blank screen, but if you type or print a message over the flashing message, it virtually disappears. The only hint of its presence is a little screen flicker like an old movie.

This program runs off the interrupt system and once installed, runs free of BASIC. You can add the entire routine to a BASIC program by replacing the values prompted for by the INPUT statements with fixed values. Turn the flash on with SYS 49152, turn it off with SYS 49155. Disable the flash during disk access, and be aware that it may throw the jiffy clock off by a little bit.

Due to the difficulty of designing an input routine that refuses messages of questionable intent, I cannot be responsible for any detrimental side effects caused by this program. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Subliminal Messenger

```
100 REM "SUBLIMINAL MESSENGER"'BAPB
110 REM SET COLORS, TIMING,
    AND MESSAGE'BCSE
120 PRINT"SCREEN COLOR"CHR$(32);
    :DE$=STR$(PEEK(53281)AND 15)'GUWI
130 N=LEN(DE$)+1:PRINT DE$;
    :FOR B=1 TO N:PRINT CHR$(157);
    :NEXT'KYRJ
140 INPUT N:POKE 49362,N'CJMC
150 PRINT"BORDER COLOR"CHR$(32);
    :DE$=STR$(PEEK(53280)AND 15)'GUTL
160 N=LEN(DE$)+1:PRINT DE$;
    :FOR B=1 TO N:PRINT CHR$(157);
    :NEXT'KYRM
170 INPUT N:POKE 49363,N'CJNF
180 PRINT"TEXT COLOR"CHR$(32);
    :DE$=STR$(PEEK(646)AND 15)'GSEN
190 N=LEN(DE$)+1:PRINT DE$;
    :FOR B=1 TO N:PRINT CHR$(157);
    :NEXT'KYRP
200 INPUT N:POKE 49364,N'CJOY
210 PRINT"BLINK RATE (N/60SEC. 1-255)
    [SPACE2]60";:FOR B=1 TO 4
    :PRINT CHR$(157);:NEXT'HNDK
220 INPUT N:POKE 49365,N'CJPB
230 PRINT"MESSAGE TIME(N/60SEC.
    1-255)[SPACE2]1";:FOR B=1 TO 3
    :PRINT CHR$(157);:NEXT'HNON
240 INPUT N:POKE 49366,N'CJQD
250 PRINT"SUBLIMINAL TEXT (MAX. 38
    CHARACTERS)":INPUT TEXT$'CGTN
260 IF LEN(TEXT$)>38 THEN 250'EMWH
270 POKE 648,160:PRINT CHR$(147);
    :FOR X=1 TO 12:PRINT CHR$(17);
    :NEXT'JBFO
280 FOR X=1 TO 20-LEN(TEXT$)/2
    :PRINT CHR$(32);:NEXT
    :PRINT TEXT$'KAAQ
290 POKE 648,4'BFCG
```

Continued on pg. 92

Envelopes
for the Commodore 64

How do you address the envelopes for your letters and other mailables? Chances are, unless doing a bulk mailing, you do it by hand or on your typewriter. And don't you wish you didn't have to.

Well, now you don't! With a customized version of Envelopes in your computer (and a little help from you), your printer can turn out ready-to-stuff-and-mail business or letter-size envelopes in a jiffy.

How To Customize Envelopes

Envelope Size: The addressee margin setting in Line 220 is the correct one for letter-size envelopes, but you should change it to 40 for the business size. Or, save two programs to disk: one version for each size. That's the handiest.

Printer Instructions: The printer instructions shown are for a Gemini 10X with a Tymac Connection interface. Substitute the "wording" your system understands.

Number of Address Lines: The program is set up for three-line addresses. For more return-address lines, insert additional PRINT lines; for fewer, delete any unwanted PRINT lines. To increase or decrease the number of addressee lines, change LINE 240. Make L equal one to the number of lines desired. For example, FOR L=1 to 4 will give you four prompts for four lines.

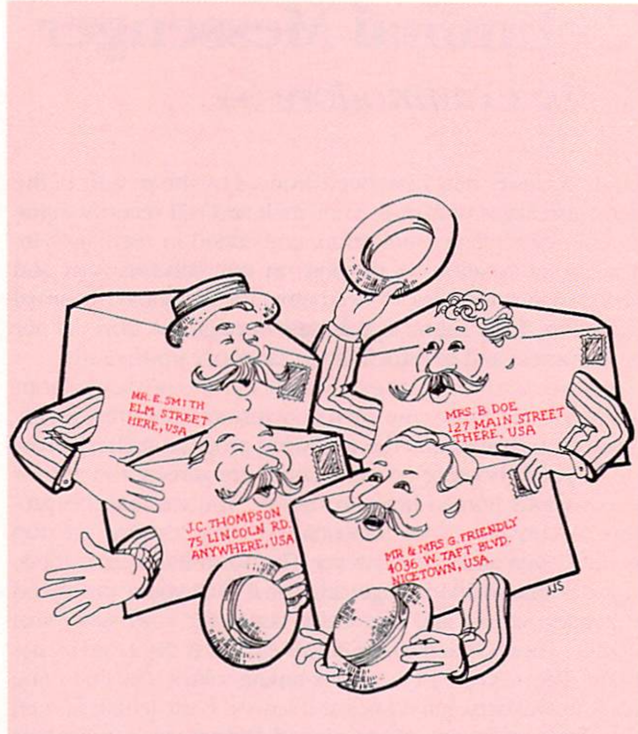
How To Use Envelopes

Remove tractor assembly, if necessary, and insert an envelope in your printer. Top of envelope should be even with the front metal straightedge near the bottom of the printer platen.

Type RUN and voila! Your return address prints automatically. Wait for printer to space down to the addressee information location and for a prompt (blinking cursor) to appear on your screen in a matter of seconds.

Now enter addressee's name and press RETURN. Your printer will not start clacking out letters immediately. Printers generally store input in a buffer and print out copy a line at a time. Yours may store one or two lines before it swings into action.

Enter each remaining line in the same manner. In deference to your computer's idiosyncrasies, omit all commas. As typewriters continue to go the way of the dinosaurs, more and more of the mail you receive will come addressed in this uncluttered style. More than 90% of mine already does.



JOYCE SKIFFINGTON

Turn out ready-to-stuff-and-mail business or letter-size envelopes in a jiffy.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Envelopes

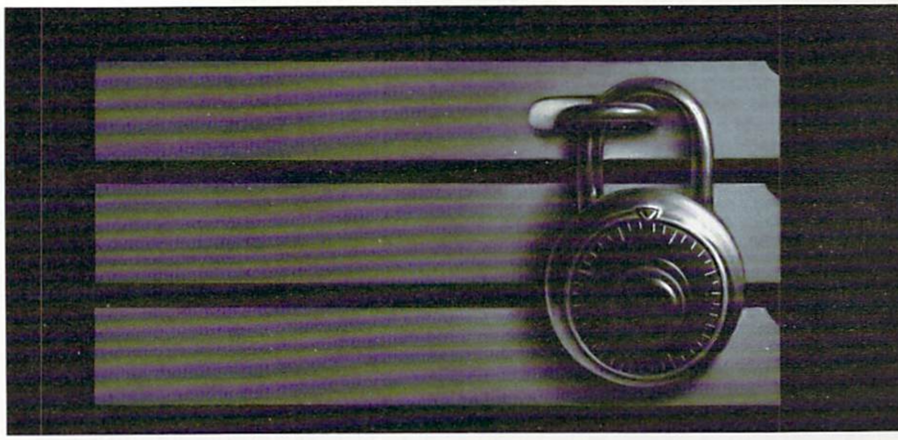
```
100 REM ENVELOPE ADDRESSING
    PROGRAM'BAHC
110 REM LETTER SIZE-SET ADDRESSEE
    MARGIN AT 25'BICF
120 REM BUSINESS SIZE-SET ADDRESSEE
    MARGIN AT 40'BKYH
130 REM OMIT ALL COMMAS IN COPY'BTAE
140 OPEN 4,4:PRINT#4'CFGB
150 CMD 4:PRINT'CCNB
160 PRINT"INSERT YOUR NAME HERE"'BAPH
170 PRINT"INSERT YOUR STREET ADDRESS
    HERE"'BANL
180 PRINT"INSERT YOUR CITY, STATE,
     AND ZIP HERE"'BABN
190 PRINT:PRINT:PRINT'DCMG
200 PRINT#4:CLOSE 4'CDRW
210 OPEN 4,4:PRINT#4'CFGY
220 PRINT#4,CHR$(27)"I"CHR$(25)
    :REM SETS ADDRESSEE MARGIN'EFBI
230 CMD 4:PRINT'CCNA
240 FOR L=1 TO 3'DDJC
250 INPUT B$'BCJB
260 PRINT B$'BCEC
270 NEXT L'BBFD
280 PRINT#4:CLOSE 4'CDRF
290 END'BACF
```

END

BY DONALD H. GRAHAM

Lock Your Line

for the VIC 20, Commodore 64 and 128



BRUCE WEINSTOCK

This program provides a locked screen line in your application program that displays a text message at the top of your screen. The message can be menu/command prompts, your name, current filename, or whatever you desire.

The method used is to insert a wedge into the normal hardware IRQ (interrupt) routine. The IRQ routine is called approximately 60 times each second by the operating system and performs lots of important tasks, like refreshing the screen, checking for keyboard activity, and a few other mundane chores. The locked line routine below kind of jumps in front of the normal IRQ routine and displays the top line on the screen, then passes control over to the normal IRQ routine. Your screen line will therefore be displayed 60 times each second, thereby giving the appearance of being locked. So if you clear the screen, the locked line remains because it's instantly put there by the wedged routine. That's how the machine-language wedge works. Now for the easy part—using it.

You don't have to know the first thing about machine language to use this routine. All you need to do is include lines 0 through 12 in the beginning of your own program and when you run it, the wedge will be installed (it lives in the cassette buffer) and activated immediately, and will remain in operation until you RESET or RUN STOP/RESTORE.

The only other thing you need to do is to include your locked line information in the REM statement in line 0. If you want this to work properly you must have the data for the locked line here, in the first program line, otherwise the routine will fill your screen line with garbage.

The quote marks are necessary to the line and the first quote must be right next to the REM. I included them so you can easily see where your line begins and ends. That's all there is to it! If you're not sure how you want the line to look, just use the data I've shown.

Display a text message at the top of your screen.

After running the program, simply list the program and edit line 0. Your new data will appear in the locked line as soon as you press the RETURN key.

I've included versions for the VIC 20 (expanded and unexpanded), Commodore 64 and 128. Note that the subroutine for the 128 is a little different.

If you want to experiment or get cute, you can do all kinds of things with this routine by changing some of the addresses in the machine language. Here are a few ideas . . .

Lock the line at the bottom of the screen by changing line 11 to 11 DATA 160, 0, 185, 7, 8, 153, 192, 7, 165, 251, 153, 192, 219, 200, 192, 40, 208, 240, 76, 49, 234

Make it flash by typing in this line in the immediate mode (or add it to your program).

FOR I=1 TO 50: POKE 251,0: FOR J=1 TO 100: NEXT: POKE 251,7: FOR J=1 TO 50: NEXT: NEXT

And here's a challenge: Add a keyboard click function to the end of this routine. Or make the routine display TWO locked lines! (It's not that difficult.)

This should be enough hints to wet your programming appetites. Try some of your own ideas. You'll feel good about telling your computer's operating system where to go! ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

VIC 20 Version

```
Ø REM"THIS PROGRAM[SPACE2]DISPLAYS
  [SPACE3]2 LOCKED LINES[SPACE5]"
1 REM UNEXPANDED VIC VERSION
7 POKE 251,5:REM SET UP COLOR OF TEXT,
  POKE WITH Ø-8
8 PRINT CHR$(14):REM SWITCH TO LOWER
  CASE
9 FOR I=828 TO 84Ø:READ X:POKE I,X
  :NEXT:FOR I= 841 TO 861:READ X
  :POKE I,X:NEXT
1Ø DATA 12Ø,169,73,141,2Ø,3,169,3,141,
  21,3,88,96
11 DATA 16Ø,Ø,185,7,16,153,Ø,3Ø,165,
  251,153,Ø,15Ø,2ØØ,192,44,2Ø8,24Ø,
  76,191,234
12 SYS 828
```

END

Expanded VIC 20 Version

```
Ø REM"THIS PROGRAM[SPACE2]DISPLAYS
```

JIFFIES/LOCK YOUR LINE

```
   [SPACE3]2 LOCKED LINES[SPACE5]"
1 REM EXPANDED VIC VERSION (+8K)
7 POKE 251,5:REM SET UP COLOR OF TEXT,
   POKE WITH Ø-8
8 PRINT CHR$(14):REM SWITCH TO LOWER
  CASE
9 FOR I=828 TO 84Ø:READ X:POKE I,X
  :NEXT:FOR I= 841 TO 861:READ X
  :POKE I,X:NEXT
1Ø DATA 12Ø,169,73,141,2Ø,3,169,3,141,
   21,3,88,96
11 DATA 16Ø,Ø,185,7,18,153,Ø,16,165,
   251,153,Ø,148,2ØØ,192,44,2Ø8,24Ø,
   76,191,234
12 SYS 828
```

END

Commodore 64 Version

```
Ø REM"[SPACE2]THIS PROGRAM DISPLAYS A
  LOCKED LINE[SPACE3]"'BARI
1 REM C-64 VERSION'BLRC
7 POKE 251,7:REM SET UP COLOR OF TEXT,
   POKE WITH Ø-8'CJMP
8 PRINT CHR$(14):REM SWITCH TO LOWER
  CASE'DWXN
9 FOR I=828 TO 84Ø:READ X:POKE I,X
  :NEXT:FOR I= 841 TO 861:READ X
  :POKE I,X:NEXT'MERU
1Ø DATA 12Ø,169,73,141,2Ø,3,169,3,141,
   21,3,88,96,16Ø'BTBF
11 DATA Ø,185,7,8,153,Ø,4,165,251,153,
   Ø,216,2ØØ,192,4Ø,2Ø8,24Ø,76,49,
   234'BODK
12 SYS 828'BDNA
```

END

Commodore 128 Version

```
Ø REM"[SPACE2]THIS PROGRAM DISPLAYS A
  LOCKED LINE[SPACE3]"'BARI
1 REM C-128 VERSION, 4Ø COLUMN MODE
  ONLY'BEHH
7 POKE 251,1:REM SET UP COLOR OF TEXT,
   POKE WITH Ø-8'CJGP
8 PRINT CHR$(14):REM SWITCH TO LOWER
  CASE'DWXN
9 FOR I=2816 TO 2828:READ X:POKE I,X
  :NEXT:FOR I=2829 TO 2849:READ X
  :POKE I,X:NEXT'MIBV
1Ø DATA 12Ø,169,13,141,2Ø,3,169,11,
   141,21,3,88,96'BQWF
11 DATA 16Ø,Ø,185,7,28,153,Ø,4,165,
   251,153,Ø,216,2ØØ,192,4Ø,2Ø8,24Ø,
   76,1Ø1,25Ø'BUCL
12 SYS 2816'BEKA
```

END

JIFFIES/SUBLIMINAL MESSENGER

Continued from pg. 89

```
3ØØ REM LOAD AND ENABLE BLINK
    ROUTINE'BAPE
31Ø IF PEEK(49152)=12Ø THEN 34Ø'ENMD
32Ø SUM=Ø:FOR A=49152 TO 49355:READ B
    :POKE A,B:SUM=SUM+B:NEXT'JGGM
33Ø IF SUM<>29ØØ6 THEN PRINT"ERROR IN
    DATA":END'GJAJ
34Ø SYS 49152:REM TURN THE BLINK
    ROUTINE ON'CCAJ
35Ø DATA 76,6,192,76,42,192,12Ø,
    173'BBVH
36Ø DATA 2Ø,3,141,2Ø4,192,173,21,
    3'BASI
37Ø DATA 141,2Ø5,192,169,57,141,2Ø,
    3'BCHJ
38Ø DATA 169,192,141,21,3,173,213,
    192'BDKK
39Ø DATA 141,2Ø6,192,169,Ø,141,2Ø7,
    192'BECM
4ØØ DATA 88,96,12Ø,173,2Ø4,192,141,
    2Ø'BDMD
41Ø DATA 3,173,2Ø5,192,141,21,3,
    88'BAIE
42Ø DATA 96,2Ø6,2Ø6,192,2Ø8,7,173,
    2Ø7'BDVF
43Ø DATA 192,24Ø,5,2Ø8,8Ø,76,2Ø1,
    192'BCMG
44Ø DATA 173,17,2Ø8,16,251,173,Ø,
    221'BCDH
45Ø DATA 41,252,9,1,141,Ø,221,173'BYVI
46Ø DATA 32,2Ø8,141,2Ø9,192,173,211,
    192'BFCK
47Ø DATA 141,32,2Ø8,173,33,2Ø8,141,
    2Ø8'BEXL
48Ø DATA 192,173,21Ø,192,141,33,2Ø8,
    169'BFHM
49Ø DATA 132,141,24,2Ø8,16Ø,39,185,
    224'BECN
5ØØ DATA 217,153,215,192,173,212,192,
    153'BGFF
51Ø DATA 224,217,136,16,241,173,214,
    192'BFDG
52Ø DATA 24Ø,16,141,2Ø6,192,169,1,
    141'BDDG
53Ø DATA 2Ø7,192,76,2Ø1,192,173,17,
    2Ø8'BELI
54Ø DATA 16,251,173,Ø,221,9,3,141'BYYI
55Ø DATA Ø,221,173,2Ø9,192,141,32,
    2Ø8'BDBJ
56Ø DATA 173,2Ø8,192,141,33,2Ø8,169,
    2Ø'BEGL
57Ø DATA 141,24,2Ø8,16Ø,39,185,215,
    192'BEIM
58Ø DATA 153,224,217,136,16,247,173,
    213'BFFN
59Ø DATA 192,141,2Ø6,192,169,Ø,141,
    2Ø7'BECO
6ØØ DATA 192,1Ø8,2Ø4,192'BPJD
```

END

LABYRINTH

Continued from pg. 30

gether any two words from each column will form a command phrase, enabling you to carry out just about any action.

This style command system deserves a closer look, especially for the novice adventurer. Not only is it a quick and efficient system which serves to keep the game flowing, but it also acts to assure the player that every problem has a solution. Since virtually all the possible actions are listed on your play field, solving any puzzle is really just a matter of finding the right noun/verb combination. So even if you've got your back to the wall, a patient player will more often than not uncover a route of escape.

But even with this helpful feature, the road to Jareth's castle is a long and winding one. Players will not only be expected to master the obvious pathfinding skills, but to also know what objects to pick up or drop, which characters should be approached and grilled, and when it's the right time to turn and run for your life. Hard core adventurers will appreciate the strategic depth of play and the satisfying, tough puzzles. Newcomers will be attracted and held by the crisp clear graphics, simple play mechanics and the life-restoring save feature which will hold your progress on disk whenever a risky situation is approached. And finally, for all you fans of the Henson flick, you'll be happy to know that many of the movie's more memorable characters have survived the transformation intact: Sir Didymus, Ludo, Hoggle, the Fireys, Alph and Ralph are all present and accounted for.

With *Labyrinth*, being helplessly lost has never been so much fun. ■

Cutting Corners
Notes from a Walled Traveler

Oh, it can be so confusing spending time and energy to get from here to there only to find out that there's a door that leads nowhere but back to here. If you're not careful, *Labyrinth* will have your head spinning and shaking with frustration. The sinister tricks of Goblin Kings can do that to you. But if you concentrate and pay attention to the signs, signals and clues scattered about, you'll find that this treacherous road does have a reachable destination. It just takes a little work—with a touch of luck. I've supplied a few preparatory tips.

First of all, if you detect a character chasing you, run away from him. It's probably one of Jareth's henchmen, and he's surely up to no good. Its better to just stay out of his way. With all other characters, you must remember that no creature, no matter how strange or bizarre, has been frivolously placed in this maze. Everyone you encounter holds a certain piece to the overall puzzle, and it's up to you to uncover it. You will usually gain more information by being patient and courteous rather than course and aggressive. In this area, the two most helpful verbs will be give and ask. Also, you may have to probe certain characters a few times before they will give a pertinent response, but keep at it. As a general rule, if you leave a personal encounter empty-handed, you haven't approached it correctly.

Jareth's favorite pitfall is the trap door, an obstacle which is used extensively by him and his Goblins throughout the maze. When you are unfortunate enough to step on one, you will be dropped into a small oubliette. Each one of these pits is a little different than the next, and recognizing the uniqueness of each structure is the key to escaping. If nothing is visibly different, search for something invisible. And if all else fails, resort to going through all the possible combinations of nouns and verbs. Sooner or later, you're bound to stumble across the answer.

Whenever you have completed a long and difficult part of the journey, or if you're about to depart on an experimental potentially dangerous step forward, make certain to save all of your progress to disk. In *Labyrinth*, death can come very quickly, and there's nothing more frustrating than needlessly retracing an hour's worth of steps. But be careful with this function, for it can get tricky. The journey has been broken down into dozens of smaller sections, each with its own location title. Whenever the program is asked to restore your position, it will place you and your belongings at the very beginning of the saved section, even if you had initially passed further.

Unlike other maze contests, detailed mapping is not necessary to find your way around this labyrinth. But some kind of note-taking is advisable. Certain doorways and passages are bridges to other sections of the maze. These connections will remain constant play after play. To prevent yourself from circling, it is worth your time to jot down these key exits whenever you come across them. ■

Continued from pg. 12

will lose it and have to get a new one if you don't answer all three questions correctly. If you succeed, Holmes' synthesized voice congratulates you with "Quite elementary," "Splendid deduction" or another remark. Then you're rated as an Inspector, Sergeant or Constable, depending on the number of clues you needed to crack the case.

Animation, music, sound effects and the interface are exemplary, and disk access is brisk. It's not an object-oriented adventure, for you can't pick up things and use them to solve puzzles; the problem-solving is all cerebral, and unique because of competitive aspects of the game. Two extra case disks (15 to a disk) are available at $14.95 each, and more may be released.

Intellicreations' *Gunslinger* more closely adheres to the traditional format of a graphic adventure, with full-screen graphics and text below. You can use the joystick to pick nouns and verbs from on-screen lists or type your commands. (Either way, the parser and vocubulary are not up to par.) As a former Texas Ranger, you have two goals. First you must rescue a friend who is about to be unjustly hanged in Mexico, then you've got to settle matters with the Dalton Brothers. An introductory level game, *Gunslinger* may also appeal to experienced adventurers looking for an unusual theme, for this is the first western adventure I've ever seen.

If you're seeking an introductory level role-playing game, Sierra's *Wrath of Denethenor* dares you to defeat the evil Lord Denethenor, who has taken over four islands that comprise this fantasy land. It is a one-character scenario whose combat and magic systems aren't as complex as those in the more advanced games. Character creation is also simplified. There are no classes such as Priest or Fighter from which to choose, so you won't be plagued by doubts as to whether you made the best decision.

The presentation resembles an *Ultima*, with an aerial view of the countryside and towns, and mazes that require some mapping skills. Animated monsters roam the land, and combat resolution is similar to *Ultima II* or *III*. However, here you get to aim your blows by swinging high, low or right at the monster's gut.

You'll hear occasional sound effects, and can converse with the townspeople for clues to the game's numerous puzzles. A saved game may be restored, and novices will appreciate a new option that lets you start over with the same character yet still hold on to some of the things he has already acquired. This is especially useful if you realize you have saved the game in an awkward situation, if, for example, you are surrounded by a pack of four-armed cysestons or are on the verge of running out of food. C

Tips of the Month
The Bard's Tale II

Here's how to get rich quick. First make an extra copy of your character disk. Go straight to the bank. If you've already spent your gold, sell everything at Garth's first. Pool the gold and deposit it. Now withdraw it, but insert the other disk before typing in your account number. After you get the gold, replace the first disk, withdraw the gold in the account and deposit it. You've doubled your money. This can be repeated until you've got trillions-more than enough to outfit your party and pay for all the temple visits needed to heal or resurrect them.

Another trick allows you to add up to six ArchMages to your crew, if you have at least one such character from *The Bard's Tale*. With the update option, move him to *The Bard's Tale II*. Now rename him, and you can move the original ArchMage over again. Equip each spellcaster with a staff so their spell points are constantly replenished while in a dungeon, and find conjurstaffs for them so they only use half as many spell points when casting spells.

To decode the following answers, count back two letters—numbers don't change. You can enter the Stone Maze by saying "htggbg" and "rngcug" to the Strange Mage in the middle of the square in the pqtvjyguv corner of Eqnuug. Go to level 0,9P,18G to learn the code for the Dreamspell. In combat it completely heals your party, boosts their armor and ability to hit the enemy, and smacks all monsters with Manager's Mallet. If cast when not in combat, the Dreamspell teleports everyone to the PO,GO square of any of the seven dungeons. C

BY DONALD P. MAPLE

Print Screen Utility with Function Keys

for the Commodore 64 and 1525-compatible printer

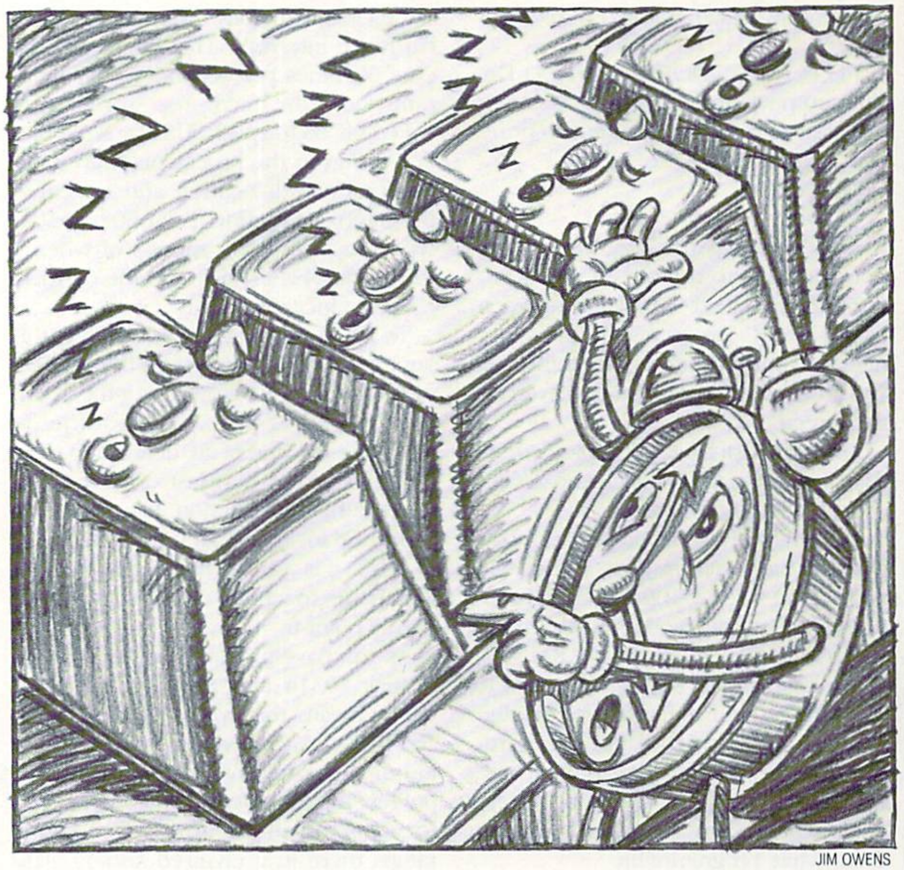
This three-for-the-price-of-one utility will enable you to print screens of your favorite programs at a touch of a key without any added programming. It will also enable you to reroute the output to printer for easy program listings with minimum effort. And last, but not least, it adds eight extra function keys—doubling the number of function keys!

Over the last few years, there have been several programs in various magazines to wake up those idle function keys gathering dust at the edge of your Commodore 64. All of these programs, however, are doing little more than simulating the typing of BASIC commands and are known under the generic name "dynamic keyboard approach." This, while offering relative ease of programmability, is also very limiting by constraining the functions to ten-character BASIC commands.

What is really needed is a true interface with the operating system. This will not only become totally transparent to whatever happens to be running at the time, but will offer unlimited opportunities for expansion. Yet as always, one can not get something for nothing. As you have probably already guessed, it means going to machine language, which in turn means that the ease of programability will be limited. However, as it will soon become apparent, any machine-language programmer will find that this routine is very easy to interface with.

While working on the above, as well as on other projects, the idea for the remaining two functions of this three-pack utility took shape. It also provides an example of how to interface with the function key handler routine.

Regardless of what type of things you do on your computer, I am sure that quite often you must have wished as I have that you could somehow take a quick snapshot of the screen and send it to printer without having to undergo the tedious OPEN4,4-CMD4-LIST or return to the monitor (SUPERMON kind)-PRINT#4-CLOSE4. Furthermore, if you were to add printing to your favorite program it gets even more complicated.



JIM OWENS

Well, wish no more.

How To Use

Type in the BASIC loader using the Magazine Entry Program. Do not be alarmed by all those letters in the DATA statements where you would normally expect only numbers. By using the hexadecimal notation for data, the typing is reduced by about a third. There are also eight instead of usual six numbers on a given line which reduces typing even more.

Having completed the typing, save the program first then run it. The screen contains the range of memory locations into which the machine language is being loaded. The counter in reverse video will constantly change to reflect the memory locations loaded as well as to provide a visual clue that the program is running. The BASIC loader contains the checksum to assure that the data loaded is correct. If everything has gone well the program will display "OKEY-DOKEY," otherwise "SOMETHING'S WRONG" will be displayed to indicate it is time to go back and doublecheck those numbers.

Assuming everything has gone well, the function keys will be activated as follows.

F9 (COMMODORE key + F1): Will print whatever is on the screen including the graphics characters or reverse characters and will also put the printer in upper- or lower-case reflecting the current screen status. Since the screen is only 40 characters wide and the printer supports 80, F9 can be instructed to start printing anywhere from columns 1 through 41 inclusive. The default is column 1. To change it type POKE 49639,n where n is the column number in the range 1 to 41. If n is a number below or above the range, it will default to 1 or 41 respectively. (The address to poke to is $C1E7 in hexadecimal.)

While the printing is in progress, the cursor will follow the characters currently being sent to printer. The keyboard will lock up while the screen is being printed. Once the printing is

completed the cursor will return to where it was when the F9 key was pressed.

F11 (COMMODORE key + F3): Default output toggle. Pressing this key will change the default output to printer. It is equivalent to

OPEN4,4
CMD4

After pressing this key, everything normally sent to the screen will go to the printer instead. This is useful when listing BASIC programs or disassembling memory to printer. Anything you type, however, will still be displayed on the screen.

Once the printing is complete, press the same F11 again to toggle the default output back to the screen.

F13 (COMMODORE key + F5): This disables the function keys. To enable again type SYS12*4096. These functions will not only work in direct mode (such as BASIC editor or SUPERMON), but from within most programs as well. The only programs that will disable the keys are those that change the hardware interrupt vector. Also, while the editor is in the quote mode the F-keys are disabled. This facilitates assigning them while programming.

If the printer is off when the printing is initiated, either with F9 or F11, the printing defaults back to the screen.

How It's Done

And now for all of you interested in how-do-day-do-dat. It will not come as a surprise that this is again a program that wedges itself between a regular interrupt vector and the interrupt routine. But first a few words about the interrupt processing itself.

The driving force in every computer is the clock that actually provides the cycles for the microprocessor. These same cycles are the measure of how fast an instruction is being executed. When we say that an instruction takes three cycles, it means that the clock will tick three times. In the 64, this clock ticks at the rate of one megahertz, which is to say one million ticks per second. This same clock provides the signal for the hardware interrupt. This interrupt occurs 60 times per second and at that time one of the microprocessor lines is ticked-off, so to speak. This causes a reflex action in the processor to go to a predetermined location and execute the interrupt routine. For 6502/6510-type processors, the address of where to go is at $FFFE-$FFFF. On the 64 this points to location $FF48.

To make things more interesting, this same location is also where the BRK instruction ends up, again using the pointer at $FFFE-$FFFF. So the routine at $FF48 has to, first of all, determine what type of interrupt has just occurred. If it was the BRK instruction, it branches to wherever locations $0316-$0317 point to, while if is was the hardware interrupt it branches to wherever locations $0314-$0315 point to.

As you have probably noticed, the locations $0314 and $0315 are in RAM which means that we can change them and that is exactly what we do to wedge in our program. The program, however, politely makes note of where these two locations point to and, when done, jumps there in a civilized fashion. This means that if some other program has already modified the vector, this utility will maintain it. Normally, however, $0314-$0315 will point to $EA31.

The routine that tests for function keys lives at $C000 in the free RAM area above BASIC. Once it has determined that a function key has been pressed, it obtains the address of where to go to from the table at $C070-$C08F. This table contains 16 addresses for all the function keys. The order of these addresses is somewhat unusual due to the strange keyboard decoding by the operating system.

F1/2 = $04
F3/4 = $05
F5/6 = $06
F7/8 = $03

Therefore the addresses are as follows:

$C070-$C071 = F7
$C072-$C073 = F1
$C074-$C075 = F3
$C076-$C077 = F5

And then the pattern repeats only in addition to the function key a special key must be pressed. These special keys can be either SHIFT (giving F8/F2/F4/F6), COMMODORE (giving F15/F9/F11/F13), or CTRL (giving F16/F10/F12/F14).

Once the address has been obtained, the cursor is put to sleep and an additional interrupt is created to follow the original hardware interrupt.

Even if all this seems a bit overwhelming, to add your own machine-language routines, simply follow the next two steps: put the address of the function key in the table at $C070-$C08F and end your program with JMP $C060. And that is all there is to it.

How It's Done

In the beginning it seemed a fairly simple task, but as it always turns out, nothing is as simple as it looks. The first hurdle was that the screen memory does not contain Commodore ASCII but screen codes. So they had to be converted. Also, the screen can be in two modes which influences the characters displayed. The upper/lower-case can be toggled by pressing Commodore and SHIFT keys simultaneously. I wanted to have that reflected in the printout. A quick check in the Programmers Reference Guide revealed that bit 1 of register $D018 determines the screen mode. Zero means upper-case and one means lower-case. While fine-tuning the program I found that the print head would move to the end of line even if the line was blank. This seemed inefficient and slowed the printing down. So a chunk of code took care of that. And then there was the quote mode!

Every time a quote is sent to the printer, it goes into a quote mode. This in turn changes all the subsequent characters until the second quote is detected. The only way to circumvent this was by putting the printer in graphics mode and printing the quote character that way. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Print Screen Utility

```
10 F=49152:T=49310:GOSUB 50'DQFC
20 F=49408:T=49661:GOSUB 50'DQSD
30 IF CS=53980 THEN PRINT" OKEY-DOKEY"
   :SYS 12*4096:END'HPEJ
40 PRINT" SOMETHING'S WRONG!":END'CBUG
50 PRINT"[CLEAR] POKING
   FROM"F"TO"T'BCCG
60 FOR I=F TO T:READ X$
   :PRINT"[HOME,DOWN,RVS]"I'FIWH
70 L=48:IF ASC(LEFT$(X$,
   1))>57 THEN L=55'HRYL
80 R=48:IF ASC(RIGHT$(X$,
   1))>57 THEN R=55'HRMM
```

Continued on pg. 99

BY ALEXANDER PROTOPAPAS

Fun with Einstein

for the Commodore 64



Have you ever wondered how much shorter the shuttle gets when it is orbiting the earth or what would happen if you were to turn all of your body into energy? Probably not. Nevertheless, these are all quite valid questions for a physicist. Einstein proved in his Theory of Relativity that questions like these have answers. In fact, he proved that the velocity of an object affects its length and mass. Furthermore, if someone were to travel on a spaceship at a very high speed, he would find that when he returned to earth, the world would be much older than him. This would almost be like traveling into the future! (However, you would not be able to get back to your time of departure.)

The same thing happens when you are driving your car, only the effect is much smaller. For example, suppose you are driving at 55 miles per hour. Your car's mass would actually increase while its length would actually decrease. And when you get out of your car, you will find that the world is actually a little older than you. I am sure you are probably wondering why you have never noticed this. This is because the changes that do occur are so infinitesimally small they are almost impossible to note.

Einstein's famous Theory of Relativity also states that matter can be transformed into energy and vice versa. I am quite sure that everyone is familiar with the Equation $E = mc$ (where E represents energy, m is mass and c equals the speed of light). It was this equation which allowed the development of the atomic bomb. As a matter of fact, an atomic bomb explodes only because a certain amount of matter (about a pound) is converted into energy.

If you find Einstein's theories fascinating, I strongly suggest that you pick up a copy of *Einstein's Universe* by Nigel Calder. It is interesting and very easily understood by non-scientists.

What Fun with Einstein does is allow you to input various values and find out how an imaginary object is affected. You will be able to find out how much shorter and heavier an object becomes when it travels at a certain speed. You will also be able to see how much older the world would be if you left it traveling at a certain velocity for a certain period of time. Finally, you will be able to find out how much energy would be released if a certain mass were to be converted completely into energy.

How To Use The Program

This program is relatively simple to use. After you have typed it in, type RUN and press RETURN. On your display screen, you should see the words "FUN WITH EINSTEIN." After about ten seconds, a menu should appear with the various choices you have. If you are interested in seeing how old the world you left would be after you have traveled at a certain velocity for a certain period of time, choose "TIME TRANSFORMATIONS" by pressing F1. If you would rather see how much shorter something gets when it is traveling at a high velocity, then choose "LENGTH TRANSFORMATIONS" by pressing F3. To find out how much heavier an object becomes when it is traveling at a certain speed, press F5 to choose "MASS TRANSFORMATIONS." Finally, if you are interested in seeing how much energy a mass can be converted into, press F7 to choose "MASS-ENERGY RELATIONSHIP."

After you have made a menu choice, the computer will ask you various questions. One of them (depending on the menu choice you have made) will concern the velocity of your imaginary object. See what happens if you enter the velocity of light (300,000 kilometers per second or 186,000 miles per second).

I should warn you that unless the velocities you enter are large enough, you will not notice any change in the object. If you do plan on working with relatively small velocities, I suggest that you work with smaller units of length, time or mass. For example, rather than entering a value of one hour, enter a value of 3600 seconds. If this is done, you will find that the output the computer gives you will be both more exact and the change in the imaginary object will be more noticeable.

How The Program Works

The program itself is very simple. The initial screen display is generated through the use of READ and DATA statements rather than exclusively PRINT statements. I have found that this method is much more convenient than a series of PRINT statements. As for the rest of the program, it only involves plugging in input into a series of formulas that generate the appropriate output. If you are interested in the more intricate workings of the program, I suggest that you examine the REM statements found throughout. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Fun with Einstein

```
5 PRINT"[CLEAR,WHITE]"'BAYE
10 POKE 53280,0:POKE 53281,0
   :READ A,B'DTXC
20 IF A=99 THEN 90'DFAB
25 IF A=100 THEN GOTO 265'EHTG
40 PRINT TAB(A-1);'DENC
50 FOR X=1 TO B'DDLD
60 PRINT"[RVS]*";'BBRD
70 NEXT X'BBRD
80 GOTO 10'BCIE
90 PRINT'BACF
100 GOTO 10'BCIU
120 DATA 99,0,99,0,3,3,8,1,11,1,14,2,
    18,1,99,0'BMSE
130 DATA 3,1,8,1,11,1,14,1,16,1,18,1,
    99,0'BHLE
140 DATA 3,2,8,1,11,1,14,1,16,1,18,1,
    99,0'BHMF
150 DATA 3,1,8,1,11,1,14,1,16,1,18,1,
    99,0'BHLG
160 DATA 3,1,9,2,14,1,17,2,99,0'BWAF
```

```
170 DATA 99,0,99,0,3,1,5,1,7,1,10,1,
    13,3,18,1,20,1,99,0'BVCL
180 DATA 3,1,5,1,7,1,10,1,14,1,18,1,
    20,1,99,0'BLNK
190 DATA 3,1,5,1,7,1,10,1,14,1,18,3,
    99,0'BGLK
200 DATA 3,1,5,1,7,1,10,1,14,1,18,1,
    20,1,99,0'BLND
210 DATA 3,5,10,1,14,1,18,1,20,1,99,0,
    99,0,99,0'BNKE
220 DATA 3,3,8,1,11,2,15,1,18,3,23,3,
    28,3,33,1,36,2,40,1,99,0'BCHI
230 DATA 3,1,8,1,11,1,13,1,15,1,18,1,
    24,1,28,1,33,1,36,1,38,1,40,1,99,
    0'BMRL
240 DATA 3,2,8,1,11,1,13,1,15,1,18,3,
    24,1,28,2,33,1,36,1,38,1,40,1,99,
    0'BMVM
250 DATA 3,1,8,1,11,1,13,1,15,1,20,1,
    24,1,28,1,33,1,36,1,38,1,40,1,99,
    0'BMKN
260 DATA 3,3,8,1,11,1,14,2,18,3,24,1,
    28,3,33,1,36,1,39,2,99,0,100,
    0'BINN
265 FOR X=1 TO 4000:NEXT
    :PRINT"[CLEAR]"'FIUM
270 PRINT"[CLEAR]":PRINT TAB(18)"[RVS]
    MENU":PRINT:PRINT:PRINT:PRINT
    :PRINT'IJIL
280 PRINT"PRESS F1 FOR TIME
    TRANSFORMATIONS":PRINT:PRINT'DCCP
290 PRINT"PRESS F3 FOR LENGTH
    TRANSFORMATIONS":PRINT:PRINT'DCXR
300 PRINT"PRESS F5 FOR MASS
    TRANSFORMATIONS":PRINT:PRINT'DCLI
310 PRINT"PRESS F7 FOR MASS-ENERGY
    RELATIONSHIP":PRINT:PRINT'DCQK
315 C=300000:FL=0'CLWG
317 REM MENU CHOICES'BLSI
320 GET CH$'BDEA
330 IF CH$="[F1]"THEN 380'DGED
340 IF CH$="[F3]"THEN 450'DGDE
350 IF CH$="[F5]"THEN 490'DGIF
360 IF CH$="[F7]"THEN 540'DGFG
370 GOTO 320'BDEF
380 PRINT"[CLEAR,RVS]TIME
    TRANSFORMATIONS":PRINT:PRINT'DCIN
385 GOSUB 620'BDLL
387 GOSUB 611'BDLN
410 PRINT"WILL THE DURATION OF THE
    TRIP BE IN"'BAFI
411 PRINT"YEARS,DAYS,HOURS,
     OR SECONDS?"'BAWI
412 INPUT"ENTER THE WHOLE WORD";
    F$'BDFH
420 PRINT"HOW LONG WILL THE TRIP
    LAST"'BAXH
422 INPUT"(ENTER NUMBER VALUE ONLY)";T
    :GOSUB 690'CGUL
425 REM CALCULATIONS AND OUTPUT FOR
    TIME TRANSFORMATIONS'BSQS
430 PRINT:PRINT"WHEN YOU RETURN FROM
    YOUR TRIP THE"'CBYL
431 PRINT"OUTSIDE WORLD WILL BE ";
    (1/X)*T;" ";F$;'DLOM
432 PRINT" OLDER."'BAXF
435 REM CONTINUATION/DISCONTINUATION
    OF PROGRAM'BMDR
440 PRINT:PRINT"DO YOU WANT TO
    CONTINUE USING THIS"'CBPM
443 INPUT"PROGRAM Y/N";C$
    :IF C$="Y"THEN GOTO 270'FJNN
445 END'BACH
450 PRINT:PRINT"[CLEAR,RVS]
    LENGTH TRANSFORMATIONS":PRINT
    :PRINT'EDGN
460 GOSUB 620'BDLF
470 GOSUB 611'BDLG
475 INPUT"WHAT UNITS WILL BE USED
    (ENTIRE WORD)";U$'BDJV
477 GOSUB 690'BDSN
480 PRINT"WHAT IS THE LENGTH OF THE
    OBJECT"'BATP
481 INPUT"(ENTER NUMBER VALUE ONLY)";
    L'BCQO
483 REM CALCULATIONS AND OUTPUT FOR
    LENGTH TRANSFORMATIONS'BUIX
485 PRINT"THE OBJECT WILL BE";L-(X*L);
    " ";U$;'DLXU
487 PRINT" SHORTER.":GOTO 440'CEMR
490 PRINT:PRINT"[CLEAR,RVS]
    MASS TRANSFORMATIONS":PRINT
    :PRINT'EDSQ
500 GOSUB 620'BDLA
510 GOSUB 611'BDLB
520 PRINT"WHAT UNITS OF MASS WILL BE
    USED- ENTER"'BATL
522 INPUT"FULL WORD";M$'BDYG
525 GOSUB 690'BDSH
530 PRINT"WHAT IS THE MASS OF THE
    OBJECT- ENTER"'BAIM
532 INPUT"NUMBER VALUE ONLY";M'BCCJ
533 REM CALCULATIONS AND OUTPUT FOR
    MASS TRANSFORMATIONS'BSVS
534 PRINT"THE OBJECT'S MASS HAS
    INCREASED BY ";(1/X)*M-M;M$
    :GOTO 440'FOWV
535 GOSUB 620'BDLI
537 GOSUB 611'BDLK
540 PRINT:PRINT"[CLEAR,RVS]
    MASS-ENERGY RELATIONSHIP":PRINT
    :PRINT'EDVN
550 PRINT"WHAT UNITS IS THE MASS IN
    POUNDS/KIL-"'BAFO
555 INPUT"OGRAMS";U$:FL=1'CHHN
560 PRINT"WHAT IS THE MASS- ENTER
    ONLY NUMBER"'BARP
565 INPUT"VALUE";M'BCRM
570 IF U$="POUNDS"THEN M=M/2.3'FHYM
575 REM CALCULATIONS AND OUTPUT FOR
    MASS-ENERGY RELATIONSHIP'BWUA
580 E=M*(300000^2):E=4190*E:PRINT'GTHP
590 PRINT"IF THE MASS OF THE OBJECT
    WERE TO BE"'BABR
592 PRINT"TOTALLY CONVERTED INTO
    ENERGY, ";'BBNT
```

64 USERS ONLY/FUN WITH EINSTEIN

```
595 PRINT E;" CALORIES WOULD BE
    RELEASED."'BCKV
6ØØ PRINT:PRINT"ONE CALORIE WILL
    RAISE THE TEMPERATURE"'CBHL
6Ø2 PRINT"OF ONE GRAM OF WATER BY ONE
    DEGREE ":PRINT"CELCIUS."
    :GOTO 44Ø'DFEP
6Ø4 PRINT"CELCIUS.":GOTO 44Ø'CEYI
61Ø REM VELOCITY-TIME-UNITS
    CONVERSION SUBROUTINE'BOWN
611 PRINT"WILL THE VELOCITY INPUT BE
    PER SECOND"'BAKM
612 INPUT"OR HOUR (S/H)";T1$:F=1'CHRJ
614 IF T1$="H"THEN F=36ØØ'EIAJ
616 PRINT"WHAT IS THE VELOCITY OF THE
    OBJECT"'BASQ
617 INPUT"(ENTER ONLY NUMBER VALUE)";V
    :V=(V/F)'DIPS
618 RETURN'BAQJ
619 RETURN'BAQK
62Ø PRINT"DO YOU PREFER TO USE THE
    METRIC OR EN-"'BAKM
622 PRINT"GLISH SYSTEM OF MEASUREMENT
    "'BADM
625 INPUT"(E/M)";S$:PRINT'CEHK
63Ø PRINT"WHEN INPUTING ANY VALUES,
     REMEMBER"'BAKN
632 PRINT"WHICH SYSTEM YOU HAVE
    CHOSEN."'BACN
635 PRINT:PRINT'CBHJ
64Ø PRINT"VELOCITIES CAN ONLY BE IN
    MILES OR"'BAJN
642 PRINT"KILOMETERS PER SECOND OR
    HOUR."'BAAO
65Ø PRINT"MASS CAN ONLY BE IN POUNDS
    OR KILOGRAMS"'BAIQ
652 PRINT"WHEN USING 'ENERGY
    TRANSFORMATIONS'"'BAOR
655 PRINT"HOWEVER, IN ALL OTHER CASES
    ANY UNITS"'BAJU
657 PRINT"ARE ACCEPTABLE."'BATQ
658 REM UNITS CHOICE AND COVERSION
    SUBROUTINE'BIDX
66Ø M=1:L=1:IF S$="E"THEN C=186ØØØ
    :IF FL=1 THEN M=M*2.3'LYET
68Ø RETURN'BAQI
69Ø IF(V=>186ØØØ AND S$="E")OR
    (V=>3ØØØØØ AND S$="M")THEN GOTO
    7ØØ'MAVW
695 X=(1-(V/C)^2)^.5:RETURN'GMJU
7ØØ PRINT:PRINT"NO OBJECT CAN SURPASS
    OR EQUAL THE"'CBCL
7Ø5 PRINT"SPEED OF LIGHT BECAUSE ITS
    MASS WOULD"'BAGQ
71Ø PRINT"BECOME INFINITE AND AN
    INFINITE AMOUNT"'BAFM
715 PRINT"OF ENERGY WOULD BE REQUIRED
    TO KEEP THE"'BAUS
72Ø PRINT"OBJECT IN MOTION."
    :GOTO 44Ø'CEXJ
```

END

64 USERS ONLY/PRINT SCREEN UTILITY

Continued from pg. 96.

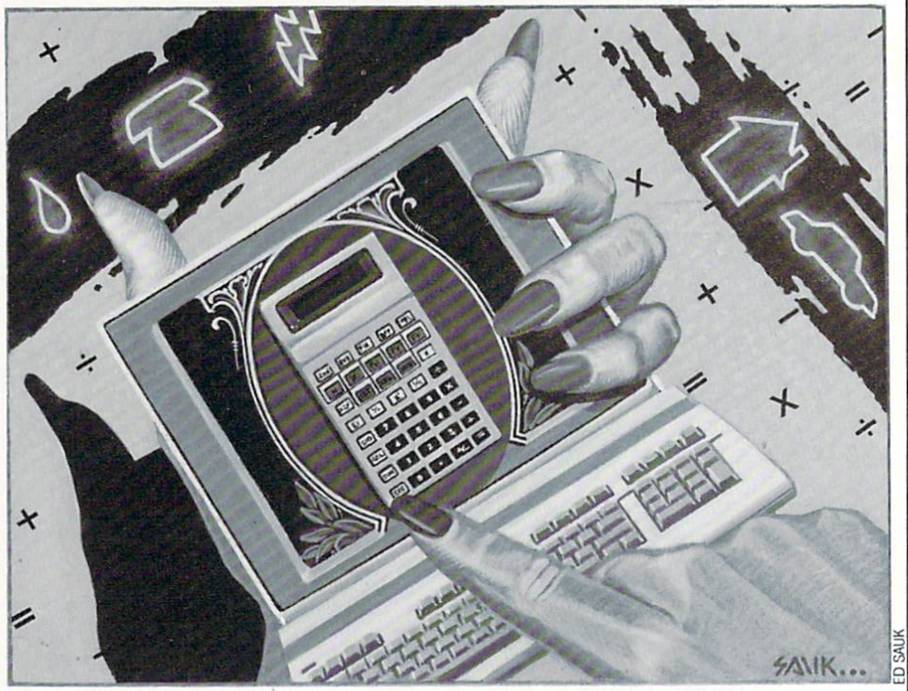
```
9Ø X=(ASC(LEFT$(X$,1))-L)*16+ASC
   (RIGHT$(X$,1))-R:POKE I,X:CS=CS+X
   :NEXT'NJVV
1ØØ RETURN'BAQU
999 REM *** DATA FOR $CØØØ -
    $CØ9E'BVUB
1ØØØ DATA 78,AD,14,Ø3,8D,57,CØ,AD'BXHX
1Ø1Ø DATA 15,Ø3,8D,58,CØ,A9,1A,8D'BXRY
1Ø2Ø DATA 14,Ø3,A9,CØ,8D,15,Ø3,58'BXEA
1Ø3Ø DATA 6Ø,4Ø,A5,D4,DØ,38,A5,C5'BXJB
1Ø4Ø DATA CD,19,CØ,FØ,31,8D,19,CØ'BXCC
1Ø5Ø DATA 38,E9,Ø3,C9,Ø4,BØ,27,AE'BXRD
1Ø6Ø DATA 8D,Ø2,FØ,1Ø,CA,FØ,ØB,CA'BXQE
1Ø7Ø DATA FØ,Ø6,CA,CA,DØ,18,69,Ø4'BXYF
1Ø8Ø DATA 69,Ø4,69,Ø4,ØA,AA,BD,7Ø'BXKG
1Ø9Ø DATA CØ,48,BD,71,CØ,48,Ø8,48'BXEH
11ØØ DATA 48,48,A9,Ø1,85,CC,4C,31'BXFY
111Ø DATA EA,3E,4D,4F,2D,4F,53,3C'BXQA
112Ø DATA A5,CE,AE,87,Ø2,AØ,ØØ,84'BXWB
113Ø DATA CF,2Ø,13,EA,4C,81,EA,FF'BXAC
114Ø DATA CØ,6Ø,CØ,6Ø,CØ,6Ø,CØ,6Ø'BXBD
115Ø DATA CØ,6Ø,CØ,6Ø,CØ,6Ø,CØ,6Ø'BXBE
116Ø DATA CØ,6Ø,C1,ØØ,C1,EF,CØ,9Ø'BXMF
117Ø DATA CØ,6Ø,CØ,6Ø,CØ,6Ø,CØ,6Ø'BXBG
118Ø DATA AD,57,CØ,8D,14,Ø3,AD,58'BXFH
119Ø DATA CØ,8D,15,Ø3,4C,6Ø,CØ'BUVH
1999 REM *** DATA FOR $C1ØØ -
     $C1FD'BVJA
2ØØØ DATA AD,11,DØ,29,6Ø,FØ,Ø3,4C'BXAY
2Ø1Ø DATA 6Ø,CØ,A2,ØØ,B5,FB,48,E8'BXYA
2Ø2Ø DATA EØ,Ø4,DØ,F8,2Ø,CA,C1,A9'BXKB
2Ø3Ø DATA FF,85,FB,A9,Ø3,85,FC,A9'BXHC
2Ø4Ø DATA 19,85,FD,AØ,29,88,FØ,6F'BXKD
2Ø5Ø DATA B1,FB,C9,2Ø,FØ,F7,84,FE'BXVE
2Ø6Ø DATA AØ,ØØ,AE,E7,C1,FØ,1Ø,EØ'BXXF
2Ø7Ø DATA 2A,9Ø,Ø2,A2,29,A9,2Ø,CA'BXAG
2Ø8Ø DATA FØ,Ø9,2Ø,D2,FF,DØ,F8,C4'BXXH
2Ø9Ø DATA FE,FØ,4C,C8,2Ø,C3,C1,C9'BXNI
21ØØ DATA 22,FØ,23,C9,A2,FØ,22,AA'BXOA
211Ø DATA 3Ø,Ø3,A9,12,2C,A9,92,2Ø'BXWB
212Ø DATA D2,FF,8A,29,7F,18,2C,6C'BXMC
213Ø DATA C1,FØ,Ø2,69,4Ø,2C,5F,C1'BXHD
214Ø DATA DØ,1D,69,4Ø,DØ,19,A9,7F'BXVE
215Ø DATA 2C,A9,ØØ,8D,89,C1,A2,Ø6'BXNF
216Ø DATA A9,Ø8,2Ø,D2,FF,BD,E7,C1'BXOG
217Ø DATA 49,7F,CA,1Ø,F5,A9,ØF,2Ø'BXHH
218Ø DATA D2,FF,2Ø,C3,C1,9Ø,BØ,A9'BXOI
219Ø DATA ØD,2Ø,D2,FF,A5,FB,18,69'BXAJ
22ØØ DATA 28,85,FB,9Ø,Ø2,E6,FC,C6'BXSB
221Ø DATA FD,FØ,Ø3,4C,23,C1,A2,Ø4'BXOC
222Ø DATA 68,95,FA,CA,DØ,FA,A9,Ø4'BXSD
223Ø DATA 2Ø,C3,FF,A9,Ø3,2Ø,C9,FF'BXWE
224Ø DATA 4C,6Ø,CØ,B1,FB,49,8Ø,91'BXOF
225Ø DATA FB,6Ø,AD,18,DØ,29,Ø2,FØ'BXXG
226Ø DATA Ø2,A9,Ø7,A8,A9,Ø4,AA,2Ø'BXCH
227Ø DATA BA,FF,A9,ØØ,2Ø,BD,FF,2Ø'BXRI
228Ø DATA CØ,FF,A2,Ø4,4C,C9,FF,Ø1'BXIJ
229Ø DATA 8Ø,87,8Ø,87,8Ø,8Ø,8Ø,A5'BXTK
23ØØ DATA 9A,C9,Ø4,FØ,Ø6,2Ø,CA,C1'BXUC
231Ø DATA 4C,6Ø,CØ,4C,B6,C1'BRSC
```

END

BY MARK JORDAN

The 128 Mode
Financial Calculator

Explore the Commodore 128 in its powerful native mode. Some of the articles in this column may be technical, some not so technical—but we guarantee that they will spark your creativity.



One of the ironies of owning and using a personal computer is illustrated each time a user stops his wordprocessing/programming/whatevering, races across the room to fetch a calculator out of a drawer, punches in a few numbers, then goes back to computing. Electronic calculators were truly a wonder in 1973, but you are now sitting at a machine that makes calculators look like abacuses by comparison. Would you shut off your 26-inch remote-controlled color TV and go to a teletype machine to enjoy the World Series?

No you wouldn't, and neither would I. So this month we're going to create an add-on financial calculator. It's designed to run as either a stand-along program or as an attachment to any BASIC program you have in the 128 mode. And it works in both 40 and 80 columns (in fact, it is self-adjusting).

Financial Calculator, as this little program is appropriately named, will figure payments, balances and payoffs for any loan, as well as perform the typical math functions of any calculator—add, subtract, multiply and divide. For those adept at BASIC, it is also easy to expand and personalize.

As always, begin by typing it in. If you haven't used *Commodore Magazine*'s checker program, turn to that section of the magazine and type it in now. And, as always, save your program before running it the first time.

How To Calculate Your Finances

Before explaining how to attach Financial Calculator to your programs, let's look at how to use it as a stand-along program. You can simply run it as it is. With its finance capabilities, you will likely often fire up the computer just to use it in its own right.

Type RUN. After a brief pause, the middle of the screen will display what looks like an ordinary calculator. You'll notice that it matches the numeric keypad of your 128, with one notable change: the function keys have been redefined as F1 = X, F3 = C, F5 = * and F7 = /. Obviously, the last two of these are for multiplication and division.

To add, subtract, multiply or divide, simply type the numbers you would as with any calculator and press ENTER to see the result. That much is easy.

The C you get with F3 means clear. To clear an entry on the display press F3 (or the C key on the keyboard). That too is intuitive.

The function of F1 is to exchange the calculator image on your screen to a mini-help screen. It is from this help screen that we can see how the interest functions work. Four alphabetic keys are functional in Financial Calculator: b/B (for balance), n/N (for number of payments), p/P (for payment amount), and i/I (for interest). The lower-case version of each is for inputing values, upper-case (shifted characters) for calculating values. Here's how they work.

First, let's set up a hypothetical situation. You want to buy a house. The price of the house is $50,000, but you only need to finance $40,000. The interest rate is 10%. The payoff period is 30 years. With these three variables, you can quickly figure the monthly payment.

Type 40000 and then press b (and be sure it's a lower-case b) to input the balance. Type 360 and press n (again lower-case) to input the number of payments. Why 360? Because 30 years equals 360 months of payments. To input your interest rate, type 10 (not .10 even though 10 percent is indeed .10) and press i.

With that done you are ready to find out exactly how much your perspective house is going to cost you in dollars per month. Press P (shifted). The calculator will display 351.02. Simple, wasn't it?

That's how you figure the payment. To figure the balance of any existing loan, simply input interest, number of payments, and payment amount then press shift B. In our mortgage case above, we can figure exactly how much we owe at any point in the loan by inputing each of the variables as above. Since we just entered balance, interest and figured the payment, there's no need to input these numbers again. Instead, we only need to figure the number of payments left on the loan. If 6 years, 4 months have passed, we simply deduct 28 (6 times 12 months plus 4 months) from 360 (the result is 332) and press n. Then press shifted B and the balance at that point is 39444.54.

Finally, we can also calculate the number of monthly payments required to pay

off the loan if we should change any of our variables. For example, we might be interested to know how much more quickly we could pay off our loan if we upped the payment $20 per month.

In our hypothetical case adding $20 to our payment makes the payment 371.02. Input that. Now press shift N and we find that the loan will require 275.57 months to pay off, a savings of 7 years. Interesting.

Interest is the only one of these four variables that you cannot calculate based on the other three. Pressing i or I simply inputs whatever number is on the display. Keep in mind that you should not type interest rates as a decimal (as in .09 for 9%). I designed it this way because we all think and talk of interest in terms of whole numbers.

Attach It To Your Program

Attaching Financial Calculator to one of your BASIC creations is as simple as adding a GOSUB 9 to your program. Once executed, Financial Calculator will preserve your function key definitions before changing them; preserve your screen before creating a window on it; place an image of the calculator in the center of your 40- or 80-column screen; wait for you to calculate to your heart's desire; and finally, restore function keys and the screen when you press escape.

Naturally, whenever attaching a subroutine written in isolation to a program, you must be wary of overlapping variables, line numbers and memory locations. In the case of memory locations, you must be careful not to disturb the following memory locations: $0b00 (2816) to $0dff (3583). A machine-language subroutine that does the job of saving and restoring the screen's contents and function key definitions resides there.

To avoid overlapping line numbers, simply start your program at line 200. With the 128 renumbering command, this should not present a problem.

As far as variables are concerned, I painstakingly converted all of them to two-character names beginning with U. The non-string variables used are sequenced in alphabetical order, from UA to UY. The string variables run from UA$ to UP$. So, you'll need to remember not to use any U's as first characters for your program variables.

As far as personalizing this calculator to do things like figure miles per gallon, or trig functions, or the number of board feet in a 2 × 4 × 10, I must leave that chore up to you for the time being. Space does not permit me to delve into program logic. However, If you'd like a future column dedicated to explaining how to tailor this program to suit your needs, write to me in care of this magazine. If the response is sufficient, we'll build a super-calculator.

As it is, I believe this program has all functions you'll ever need for figuring loans and personal finances save one—the D key. What would be its function? Discipline. But alas, it's going to take more than an 8-bit processor to work that one out.

Oh well. Until next time.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Financial Calculator

```
5 GOTO 200'BDBE
6 UQ=RWINDOW(2):UP=RCLR(5):UO=RCLR(Ø)
  :COLOR Ø,1:PRINT CHR$(14);'JDWQ
7 GOSUB 9:COLOR 5,UP:COLOR Ø,UO
  :PRINT"[HOME2]"UE$"L";'EQBM
8 TRAP:RETURN'CBIH
9 UE$=CHR$(27):UF$=UE$+"M"
  :UG$=UE$+"J"'GVBQ
1Ø UD$="123456789Ø.+-*/CX"+CHR$(13)
  +"BINP[SHFT B,SHFT I,SHFT N,SHFT P]
  "+CHR$(27)'GLQL
11 UP$="[SPACE11]":UB$="[RVS,RED,
  SPACE1Ø]":UL$="[RED,RVS]
  "+UP$+UG$'FRVI
12 UC$(Ø)=UP$'BJIB
13 IF UQ=4Ø THEN RESTORE 18:US=2931
  :UD=2838:UT=15:UU=6:UV=25:UX=19
  :UM$=UL$:UN$=UP$:UE=253:SLOW'OLQY
14 IF UQ=8Ø THEN RESTORE 27:US=2975
  :UD=2866:UT=35:UU=6:UV=45:UX=15
  :UM$="":UN$="":UO$=UL$:UE=12
  :FAST'PLCB
15 IF PEEK(2816)=16Ø THEN RESTORE 41
  :GOTO 38'GOAI
16 FOR UR=2816 TO US:READ UA$
  :UA=DEC(UA$):POKE UR,UA:NEXT
  :RESTORE 41'JFPP
17 :REM 4Ø COLUMN ML ROUTINE'BSKJ
18 DATA AØ,ØØ,B9,ØØ,1Ø,85,FA,B9,ØØ,ØD,
  99,ØØ,1Ø,A5,FA,99'BWJP
19 DATA ØØ,ØD,C8,DØ,ED,6Ø,A9,ØØ,A8,AA,
  85,FC,A9,FF,85,FA'BWQQ
2Ø DATA A9,Ø4,85,FB,2Ø,3F,ØB,E8,C8,CØ,
  ØB,DØ,F7,AØ,ØØ,18'BWMI
21 DATA A5,FA,69,28,85,FA,9Ø,Ø2,E6,FB,
  EØ,9A,DØ,E6,6Ø,A5'BWEJ
22 DATA FD,DØ,11,B1,FA,9D,8Ø,ØB,2Ø,64,
  ØB,B1,FA,9D,2Ø,ØC'BWGK
23 DATA 2Ø,6C,ØB,6Ø,BD,8Ø,ØB,91,FA,2Ø,
  64,ØB,BD,2Ø,ØC,91'BWEL
24 DATA FA,4C,5Ø,ØB,18,A5,FB,69,D4,85,
  FB,6Ø,38,A5,FB,E9'BWXM
25 DATA D4,85,FB,6Ø'BLRF
26 :REM 8Ø COLUMN ML ROUTINE'BSOJ
27 DATA AØ,ØØ,B9,ØØ,1Ø,85,FA,B9,ØØ,ØD,
  99,ØØ,1Ø,A5,FA,99'BWJP
28 DATA ØØ,ØD,C8,DØ,ED,6Ø,A2,1F,8E,ØØ,
  D6,2C,ØØ,D6,1Ø,FB'BWPQ
29 DATA 8D,Ø1,D6,6Ø,A2,1F,8E,ØØ,D6,2C,
  ØØ,D6,1Ø,FB,AD,Ø1'BWAR
3Ø DATA D6,6Ø,A9,ØØ,85,FE,85,FA,A9,ØC,
  85,FB,A9,Ø3,85,FD'BWOJ
31 DATA A9,Ø2,85,FC,2Ø,57,ØB,A9,8Ø,85,
  FA,A9,ØA,85,FC,A9'BWOK
32 DATA Ø3,85,FD,A9,ØØ,85,FE,2Ø,92,ØB,
  AØ,ØØ,2Ø,82,ØB,C8'BWML
33 DATA CØ,ØB,DØ,F8,18,A5,FA,69,ØB,85,
  FA,18,A5,FD,69,5Ø'BWBM
34 DATA 85,FD,9Ø,Ø2,E6,FC,2Ø,92,ØB,E6,
  FE,A5,FE,C9,ØA,DØ'BWGN
35 DATA D9,6Ø,A5,ØC,FØ,Ø6,B1,FA,2Ø,16,
  ØB,6Ø,2Ø,24,ØB,91'BWDN
36 DATA FA,6Ø,A5,FC,A2,12,2Ø,18,ØB,E8,
  A5,FD,2Ø,18,ØB,6Ø'BWDP
```

```
37 :'ABHG
38 SYS 2816:POKE UE,0:SYS UD'DMQL
39 FOR UR=1 TO 8:KEY UR,"":NEXT'FJSN
40 FOR UR=1 TO 8:READ UA$:KEY UR,UA$
   :NEXT'GQVH
41 DATA X,,C,,*,,/,'BLUD
42 IF UQ=80 THEN RESTORE 45'EGFF
43 FOR UR=1 TO 5:READ UA$
   :UA$(UR)=UL$+UA$+UM$:NEXT
   :UA$(6)=UO$'JLUR
44 DATA "[GRAY3,RVOFF,RIGHT2]X[RIGHT]
   C[RIGHT]*[RIGHT]/[RIGHT2]","[GRAY3,
   RVOFF,RIGHT2]7[RIGHT]8[RIGHT]9
   [RIGHT]+[RIGHT2]","[GRAY3,RVOFF,
   RIGHT2]4[RIGHT]5[RIGHT]6[RIGHT]-
   [RIGHT2]","[GRAY3,RVOFF,RIGHT2]1
   [RIGHT]2[RIGHT]3[RIGHT4]","[GRAY3,
   RVOFF,RIGHT2]0[RIGHT]0[RIGHT].
   [RIGHT]=[RIGHT2]"'BEGT
45 DATA "[RVOFF,GRAY3,RIGHT2]X[RIGHT]
   C[RIGHT]*[RIGHT]/","[RVOFF,GRAY3,
   RIGHT2]7[RIGHT]8[RIGHT]9[RIGHT]+",
   "[RVOFF,GRAY3,RIGHT2]4[RIGHT]5
   [RIGHT]6[RIGHT]-","[RVOFF,GRAY3,
   RIGHT2]1[RIGHT]2[RIGHT]3","[RVOFF,
   GRAY3,RIGHT2]0[RIGHT]0[RIGHT].
   [RIGHT]="'BEUS
46 WINDOW UT,UU,UV,UX,1
   :PRINT UF$;'CTMM
47 GOSUB 78:TRAP 109'CGQJ
48 :'ABHI
49 DO:GET KEY UA$'DEUM
50 UH=INSTR(UD$,UA$):UL=UH-11
   :IF UH=0 THEN PLAY"O2C"
   :GOTO 56'JBWO
51 IF UH=27 THEN 58'DGLF
52 IF UH>11 THEN ON UL GOSUB 60,60,60,
   60,75,78,60,94,95,96,97,99,95,102,
   104,58:GOTO 56'GIGS
53 IF UB=1 THEN PRINT"[HOME,DOWN,
   RIGHT,SPACE8]0":UI$="":UB=0'GLYM
54 UI$=UI$+UA$:UJ$=RIGHT$(UP$+UI$,9)
   :UF=VAL(UI$)'HGQR
55 PRINT"[BELL,HOME,DOWN,RIGHT,GRAY3]
   "UJ$"[HOME,DOWN2]"UB$'BGWJ
56 LOOP'BAKH
57 :'ABHI
58 SYS 2816:POKE UE,1:SYS UD
   :RETURN'ENLO
59 :'ABHK
60 PRINT"[HOME,DOWN,RIGHT,SPACE9]"
   :UJ=UI'CFJG
61 UF=VAL(UI$):UI=UL'DMEI
62 ON UJ GOSUB 69,70,71,72'CNGH
63 UH$=STR$(UF):IF LEN(UH$)>9 THEN
   UH$=LEFT$(UH$,9)'IYAQ
64 UJ$=RIGHT$(UP$+UH$,9)
   :PRINT"[HOME,DOWN,RIGHT,GRAY3]"UJ$
   :UK=UF'FWSP
65 IF UL=7 THEN UI=0:UI$=UJ$
   :UA$=" "'GROP
66 PRINT"[HOME,DOWN2,RED,RVS,SPACE5]
   "UA$"[SPACE4]"'BDNK
67 UB=1:RETURN'CEPL
68 :'ABHK
69 UF=UK+UF:RETURN'DHYO
70 UF=UK-UF:RETURN'DHAG
71 UF=UK*UF:RETURN'DHBH
72 IF UF=0 THEN UF=1'EGTJ
73 : UF=UK/UF:RETURN'DIEK
74 :'ABHH
75 PRINT"[HOME,DOWN,GRAY3,RIGHT,
   SPACE8]0":UJ$="":UI$="":UF=0:UK=0
   :RETURN'GRMS
76 :'ABHJ
77 REM -- HELP WINDOW'BMIN
78 WINDOW UT,UU,UV,UX,1'BONP
79 PRINT"[RVS,RED]"UP$" [RVOFF,SPACE9,
   RVS] "UP$'BGSQ
80 UY=(UY+1)AND 1:ON UY GOTO 91'FNIK
81 PRINT"[RVS]"UN$" B=BALANCE ";'BEPJ
82 PRINT" P=PAYMENT ";'BBYJ
83 PRINT" N= # PMTS ";'BBBK
84 PRINT" I=INTEREST";'BBQL
85 PRINT"(EX 12=12%)";'BBUM
86 PRINT UN$"[SHFT S]HIFT [SHFT B],
   [SHFT N],[SHFT P]";'BEWQ
87 IF UQ=40 THEN PRINT"CALCULATES ";
   'EFER
88 PRINT UN$"[GRAY3,SHFT E,SHFT S,
   SHFT C] TO EXIT"'BDYS
89 GOTO 92'BCSN
90 :'ABHF
91 PRINT UL$:FOR UR=1 TO 6
   :PRINT UA$(UR):NEXT'GRON
92 PRINT"[HOME,GRAY3,DOWN,RIGHT]"UJ$
   :RETURN'CEBK
93 :'ABHI
94 UM=UF:GOTO 100'CIQM
95 UC=UF*.01/12:GOTO 101'ENHP
96 UG=UF:GOTO 103'CINO
97 UN=UF:GOTO 105'CIWP
98 :'ABHN
99 UM=UN*((1-((1+UC)^-UG))/UC)
   :UF=UM'IACA
100 UK$="[SPACE2,SHFT B]ALANCE "
    :GOTO 106'CHGA
101 UK$=" [SHFT I]NTEREST "
    :GOTO 106'CHGC
102 UG=(LOG(UN)-LOG(UN-UM*UC))/LOG
    (1+UC):UF=UG'KBNK
103 UK$=" # OF PMTS":GOTO 106'CHAD
104 UN=UM/((1-((1+UC)^-UG))/UC)
    :UF=UN'IAEK
105 UK$="[SPACE2,SHFT P]AYMENT "'BDWE
106 UI$=LEFT$(STR$(UF),9)
    :UA=INSTR(UI$,"."):IF UA>0 THEN
    UI$=LEFT$(UI$,UA+2)'LLDR
107 UJ$=RIGHT$(UP$+UI$,9)'DNPH
108 PRINT"[BELL,HOME,GRAY3,DOWN,RIGHT]
    "UJ$"[HOME,DOWN2,RED,RVS]"UK$:UB=1
    :RETURN'DLBI
109 RESUME 56'BCOF
110 :'ABHV
199 REM YOUR PROGRAM STARTS HERE'BVAT
200 GOSUB 6:END'CCYW
```

END

BY BRUCE JAEGER

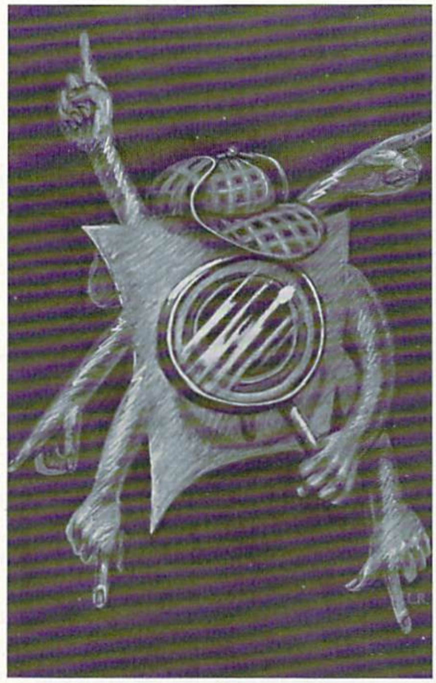
Playing With POINTER

It seems that every time I open up the Commodore 128 System Guide, a new and interesting feature of BASIC 7.0 leaps out at me. POINTER is one of them. It's a little-appreciated function that lets you find out just where a variable is stored in memory.

BASIC programs are stored by the Commodore 128 in Bank 0 and all variables are stored in Bank 1. Normally we never have to worry about where BASIC puts a variable. Our programs just say T=X+1 or NA$="BILLY BOB" and we don't actually have to worry about where the computer is sticking that information. But sometimes there are some tricks we can play to speed up a slow part of a program or perhaps to do some character-string manipulations that are clumsy in BASIC—that's where it helps to know the actual point in memory where a variable is stored.

The BASIC 7.0 function POINTER does just that. If we have a simple variable (how about good old X=1), then executing A=POINTER(X) will return a value A that is an address in BANK 1. (Remember, that's where all the variables are stored on the 128. To peek at this address, we have to remember to type BANK 1 first.)

For a simple variable like our example, there are seven bytes of information beginning at address A. The first two bytes, PEEK(A) and PEEK(A+1), contain the variable's name. If you had named your variable RESULT, these two bytes would contain an R and an E. This is why only the first two letters count in variable names and RESULT means the same to your computer as REX or REFRIED. The five bytes following the variable's name contain the actual value of the variable.



LESLIE ROGALSKI

POINTER is a little-appreciated function that lets you find out just where a variable is stored in memory.

Character string variables are stored in memory a little differently. If we were to call the POINTER function for the character string A$, peeking the address that POINTER returns gives us a number that is the length of A$—the same as LEN(A$). However, instead of the actual contents of A$ being stored after that byte, all of the character strings are stored in a higher part of memory, and the two bytes that follow the POINTER(A$) value give us the address of where the text of A$ is actually stored, in standard 6502 low-byte, high-byte format. Whew! The example program makes this simpler.

This, of course, is not a very useful program. Heck, we already knew what A$ said! But now that we know exactly where A$ is, we could change some of its contents! Let's do something with more practical value, and compare the execution times of our direct-memory manipulation with that of changing A$ using MID$, LEFT$ and/or RIGHT$ functions. Both programs below take a character string and change all capitalized letters to their lower-case equivalent—something often necessary for adventure games, BBS commands, and so on.

The average execution time of Program A is 152 jiffies; Program B takes 234 jiffies, over half again as much time. And if you did this sort of string operation many times in a program, that extra time could really add up!

The same technique could also be used for lots of other procedures: encipher strings so nobody could read them, change everything to upper-case if desired, turn all commas and colons into other characters (useful for disk input and output), swap letters from front-to-back, or whatever your imagination comes up with.

All made easy by the POINTER function! C

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Program A
(direct memory manipulation)

```
100 TI$="000000"'BDCW
110 A$="[SHFT A,SHFT B,SHFT C,SHFT D,
    SHFT E,SHFT F,SHFT G,SHFT H,
    SHFT I,SHFT J,SHFT K,SHFT L,
    SHFT M,SHFT N,SHFT O,SHFT P,
    SHFT Q,SHFT R,SHFT S,SHFT T,
    SHFT U,SHFT V,SHFT W,SHFT X,
    SHFT Y,SHFT Z]"'BCQS
120 A$=A$+A$+A$+A$'EKSB
130 PRINT A$'BCDX
140 X=POINTER(A$)'CGBB
150 BANK 1'BCXB
160 LE=PEEK(X)   :REM LENGTH OF A$'DQAH
170 LB=PEEK(X+1):REM LOW BYTE OF
    ADDRESS'EXQL
180 HB=PEEK(X+2):REM HIGH BYTE'EPJJ
190 AD=HB*256+LB'DJPI
200 FOR X=AD TO AD+LE'EHPA
210 P=PEEK(X):REM LETTER'DLGC
220 IF(P AND 128)THEN POKE X,
    P-128'FMFD
230 NEXT'BAEY
240 PRINT A$'BCDA
250 PRINT"[SHFT T]IME:"TI'BCKE
```

END

Continued on pg. 104

PLAYING WITH POINTER

Continued from pg. 103

Program B

(string manipulation method)

```
100 TI$="000000"'BDCW
110 A$="[SHFT A,SHFT B,SHFT C,SHFT D,
    SHFT E,SHFT F,SHFT G,SHFT H,
    SHFT I,SHFT J,SHFT K,SHFT L,
    SHFT M,SHFT N,SHFT O,SHFT P,
    SHFT Q,SHFT R,SHFT S,SHFT T,
    SHFT U,SHFT V,SHFT W,SHFT X,
    SHFT Y,SHFT Z]"'BCQS
120 A$=A$+A$+A$+A$'EKSB
130 PRINT A$'BCDX
140 AA$=""'BDMA
150 FOR X=1 TO LEN(A$)'EGQD
160 T$=MID$(A$,X,1)'CKNE
170 IF T$<"[SHFT A]" OR T$>"[SHFT Z]
    " THEN 190 'FHII
180 T$=CHR$(ASC(T$)-128)'ELXI
190 AA$=AA$+T$'CIGH
200 NEXT X'BBRV
210 A$=AA$'BFNX
220 PRINT A$'BCDX
230 PRINT"[SHFT T]IME:"TI'BCKC
```

END

Tips & Tricks

Continued from pg. 14

Naming variables: It's useful to develop your own conventions for naming variables in your programs. Since I developed that habit, it's much easier for me to debug long programs, and easier to go back into old programs and figure what's going on.

I always use A$ as the variable in GET statements, and elsewhere where I can disregard the variables after checking their value. Since I never use A$ for anything that will be useful later in the program, I know it's safe to use it in a new section.

Also, I never use J for anything but the variable in a FOR-NEXT loop, and I always use J as the first variable in such a loop. If other variables are needed inside the loop, or in a nested loop, I use K, L and M. If the nesting gets too complicated, I use J1, J2, J3 and so on.

By the way, I *never* use I as a variable name, because it's too easily confused with the numeral one. When selecting other variable names, I try to choose them to be somewhat meaningful or mnemonic. I limit them to two letters, since they're easier to type than longer names, and since I haven't found much additional mnemonic value in the longer names. To me, DN$ is just as easy as DISKNAME$, and I don't have to worry about the confusion if I later set up a DI$ or DISK$.
Lucy S. Terrier
Alton, Illinois

Use that semicolon: Don't forget that a PRINT statement always causes the cursor to skip to the next line, unless it ends with a semicolon. (A comma makes the cursor move to the next print zone, but we're not interested in that here.) For example, if you clear the screen by printing a CHR$(147) or SHIFT CLR without a semicolon, the cursor will end up on the second screen line. This can be annoying if you want to print something at the very top of the screen.

To avoid the problem, just end the PRINT statement with a semicolon, like this: PRINT CHR$(147);. You can use the same technique when you change the character color. The semicolon will keep your cursor on the same line it started on.
Becky Sue Parton
North Richland Hills, Texas

All about DATA statements: Many BASIC programs contain line after line of DATA statements where the data items are numbers between 0 and 255. Those numbers are actually the steps in a machine-language program which the BASIC program is putting into memory by use of POKE statements. After the machine language has been poked, it's activated by a SYS statement, which is the machine language equivalent of RUN.

Since the DATA numbers are the decimal version of a machine-language program, they don't make any sense to the human beings who type them. And since they don't make any sense of their own, it's very easy to make mistakes when typing them. Such mistakes can be maddeningly difficult to find, as you know if you've ever made one.

Here are some tips to help you find them.

If the program includes the four-letter checksums from *Commodore Magazine*'s Entry Programs, use them. The Magazine Entry Programs are designed to detect typing errors, and are described in detail in every issue of this magazine. They are well worth the effort of typing them in.

When there is an error in a DATA statement, the computer often reports it as occurring in the line that reads the faulty statement, rather than in the DATA line itself. For debugging these problems, you can add other statements to the READ section of your BASIC program. The easiest to add is a PRINT statement, which will put each data item on the screen as it is poked, allowing you to observe the process as it occurs. If a typing error has put one of your DATA items outside the range of 0-255, you'll get an Illegal Quantity Error when the program tries to poke it. Careful use of the PRINT statement can lead you directly to the error. For example, if your program has a line like this:

```
170 READ K : POKE J,K
```

alter it temporarily to this:

```
170 READ K : PRINT K : POKE J,K
```

The new statement prints the DATA item before the poke is tried. If you get an Illegal Quantity Error, for example, the most recently printed DATA item is the culprit. Since you see it on the screen in context with its predecessors, you should be easily able to find it in the program.

You can take this idea one step further by printing not only the DATA item, but also the line number in which it appears. That line number is found in memory locations 63 and 64, and can be printed using this:

```
170 READ K : PRINT K, PEEK(63)+256*PEEK(64) : POKE J,K
```

Now you can follow things even easier and more thoroughly.

If the data items and line numbers print too quickly to the screen, you can use the Commodore or CTRL key to slow them down. (The key you use depends on whether you have a 64 or a 128.) To take the slowdown one step further, add this line:

```
171 GET A$ : IF A$="" THEN 171
```

This will look for a keypress after each data item is read, printed and poked. To move ahead quickly, just hold down the spacebar (it repeats!). To move step-by-step, use any non-

repeating key. If you still have problems after using the above steps, you should carefully proofread your program, bearing in mind that the printed program is almost never in error. When proofreading, it's helpful to involve another person, since you will be somewhat distressed, and since you may have already overlooked the error several times.

Common mistakes to look for at this stage are: leaving out a DATA item or a whole line; duplicating an item or a line; putting extra commas inside or at the end of a line; and using a period instead of a comma. I'm sure your creative mind can conjure up some others, but these are the ones most often seen.

Louis F. Sander
Pittsburgh, Pennsylvania

Shaky computing: Has your 64 ever had a nervous breakdown? It might seem that way with this:

```
10 FOR J=0 TO 15 : POKE 53270,J : NEXT : GOTO 10
```

By eliminating the GOTO, you can use it as a special effect in BASIC games or other programs using the text screen.

For an even stranger effect, change the 15 in the FOR-NEXT loop to a 31.

James Frisa, III
Cincinnati, Ohio

Variable Dump: This 64 utility lets you see the values of all variables that exist in system memory. It can be an invaluable aid to debugging BASIC programs.

To use it, type in the program, save it to a disk, then run it. If you get an error message, recheck your DATA statements. Once the program has been run successfully, entering the SYS command shown on the screen will give you a dump of all the variables in memory.

Pressing the STOP key will pause the listing for the duration of the keypress. Pressing the CTRL key will slow the listing down. The program places 189 bytes of machine language into memory.

Variable SA in line 110 sets the starting address of this code, which can be anywhere there are 189 free bytes. Memory location 820 is another good place to put it. Wherever you put the machine language, Variable Dump will tell you the proper SYS command.

Shachar Ebel
Rehovot, Israel

```
100 PRINT"[CLEAR]VARIABLE DUMP -
    SHACHAR EBEL":PRINT"[DOWN]WORKING
    [UP]"
110 SA=49152:REM RELOCATABLE START
    ADDR
120 FOR J=1 TO 193:READ K:CS=CS+K:NEXT
    :IF CS<>24349 THEN PRINT"DATA
    ERROR":STOP
130 RESTORE:FOR J=SA TO SA+188:READ K
    :POKE J,K:NEXT
140 AD=SA+47:GOSUB 160:AD=SA+170
    :FOR J=0 TO 2:GOSUB 160:NEXT
150 PRINT"SYS";SA;"WILL DUMP THE
    VARIABLES.":END
160 READ K:POKE SA+K,AD-256*INT
    (AD/256):POKE SA+K+1,INT(AD/256)
    :RETURN
201 DATA 165,045,164,046,133,251,132,
    252
202 DATA 160,001,185,251,000,217,047,
    000
203 DATA 208,004,136,016,245,096,032,
    047
204 DATA 192,024,165,251,105,007,133,
    251
205 DATA 144,002,230,252,169,013,032,
    022
206 DATA 231,165,145,016,252,048,217,
    160
207 DATA 000,177,251,170,041,127,032,
    022
208 DATA 231,200,177,251,072,041,127,
    168
209 DATA 032,022,231,104,016,063,138,
    048
210 DATA 041,169,036,032,170,192,169,
    034
211 DATA 032,022,231,177,251,153,251,
    000
212 DATA 200,192,005,208,246,165,253,
    240
213 DATA 012,160,000,177,254,032,022,
    231
214 DATA 200,196,253,208,246,169,034,
    076
215 DATA 022,231,169,037,032,170,192,
    177
216 DATA 251,170,200,177,251,168,138,
    032
217 DATA 145,179,024,144,031,169,032,
    032
218 DATA 170,192,177,251,153,095,000,
    200
219 DATA 192,007,208,246,165,098,170,
    009
220 DATA 128,133,098,160,000,138,016,
    002
221 DATA 160,255,132,102,032,221,189,
    076
222 DATA 030,171,032,022,231,152,208,
    005
223 DATA 169,032,032,022,231,169,061,
    032
224 DATA 022,231,160,002,096,023,076,
    117
225 DATA 136
```

END

Disabling 64 SAVE: If you want to prevent a 64 program from being saved, all you have to do is adjust the vector in memory locations 818 and 819. To cause a system reset when a save is attempted, do this:

```
50 POKE 818,226 : POKE 819,252
```

You can undo the change by:

```
60 POKE 818,237 : POKE 819,245
```

Remember that SAVE will work in the normal way until the first of the above lines is executed.

If you'd like something other than a reset to occur when a save is attempted, that's also easy to do. Just use this generalized routine:

```
50 B=64738 : HI=INT(B/256) : LO=B-256*HI :
   POKE 818,LO : POKE 819,HI
```

In the routine, you set B to the address to which you want a

Tips & Tricks

SAVE to be directed. Everything else will be automatic. Here, too, you undo your work by executing the pokes in line 60 above.
Nolan Whitaker
Jeffersonville, Kentucky

Disabling 64 RESTORE: Sometimes it's nice to disable the RESTORE key, or to have it do something other than reset the computer. After all, interrupting some programs would be disastrous, or (horrors!) might allow somebody to copy them.

Pressing the RESTORE key causes program execution to jump to a routine pointed to by a vector in memory locations 792 and 793. Since those locations are in RAM, you can change the vector and thereby change the function of the RESTORE key.

To cause a system reset when RESTORE is pressed, do this:

```
80 POKE 792,226 : POKE 793,252
```

To undo the change, do this:

```
90 POKE 792,71 : POKE 793,254
```

This more general routine can direct execution to anyplace in memory:

```
80 R=64738 : HI=INT(R/256) : LO=R-256*HI :
   POKE 792,LO : POKE 793,HI
```

Set R to the address to which you want a RESTORE to be directed. Undo the change by executing the code in line 90 above.
Nolan Whitaker
Jeffersonville, Kentucky

Keybeeper: This small program for the 64 makes a beep each time you press a key. It has different tones for the RETURN key, CRSR and function keys, and the other alphanumeric keys.
Pablo Trincavelli
Rosario, Argentina

```
100 REM KEYBEEPER - PABLO TRINCAVELLI
110 POKE 54275,8:POKE 54277,36
    :POKE 54278,9:POKE 254,65
120 FOR J=0 TO 54:READ K
    :POKE 50000+J,K:CS=CS+K:NEXT
130 IF CS=6539 THEN SYS 50000:END
140 PRINT"DATA ERROR!":STOP
150 DATA 120,169,098,141,020,003,169,
    195
160 DATA 141,021,003,088,169,015,141,
    024
170 DATA 212,096,165,197,164,254,136,
    201
180 DATA 064,240,022,162,128,201,001,
    240
190 DATA 012,162,064,201,008,144,006,
    201
200 DATA 051,240,002,162,016,142,001,
    212
210 DATA 200,140,004,212,076,049,234
```

END

128 Appender: Building up programs from subroutines is a lot more convenient if you can easily append one program to another. This short BASIC loader puts a machine-language routine into the 128's cassette buffer to make appending as easy as pressing a few keys. Run this program to enable the Appender. Then do a NEW to remove it from memory. Now load a program to which you want to append one or more others. To append a program to the one already in memory, just press the F1 key and load the second program in the normal way. When the READY prompt returns, press the F3 key. If you do a list at this point, you'll see that your program consists of the first one with the second appended to it. You can continue to append others using the same routine—press F1, load a program, then press F3. Since the Appender doesn't look at line numbers, it's up to you to be sure that all line numbers in the appended program are higher than the highest line number in the one to which it's appended. The 128's RENUMBER command should make this job a cinch.
Stanley L. Anderson
Tishomingo, Oklahoma

```
100 PRINT"[CLEAR,RVS,SPACE2]
    C-128 APPENDER - STANLEY L.
    ANDERSON[SPACE2,RVOFF]"
110 FOR J=1 TO 48:READ K$
    :CS=CS+DEC(K$):NEXT
    :IF CS<>2816 THEN PRINT"DATA
    ERROR":STOP
120 RESTORE:FOR J=2816 TO 2863:READ K$
    :POKE J,DEC(K$):NEXT
130 KEY 1,"SYS2816:REM LOAD PROGRAM,
     THEN PRESS F3."+CHR$(13)
140 KEY 3,"SYS2848:REM APPEND
    COMPLETE!"+CHR$(13)
150 PRINT"[DOWN]TO APPEND A PROGRAM,
     PRESS F1 THEN LOAD"
160 PRINT"IT. WHEN THE LOAD IS
    FINISHED, PRESS F3."
170 PRINT"[DOWN]REPEAT TO APPEND
    ADDITIONAL PROGRAMS.[DOWN]"
180 PRINT"SAVE TO DISK WHEN FINISHED.
    [DOWN2]"
190 DATA A5,2D,8D,18,0B,A5,2E,8D,19,0B
200 DATA 38,AD,10,12,E9,02,85,2D,AD,11
210 DATA 12,85,2E,60,01,01,01,01,01,01
220 DATA 01,01,AD,18,0B,85,2D,AD,19,0B
230 DATA 85,2E,60,01,01,01,01,01
```

END

Flashing cursor for GETKEY: If you are in 80-column mode on your 128, you can get a flashing cursor after your GETKEY prompt by doing this:

```
10 PRINT "PRESS A KEY ";CHR$(27);"S"
20 GETKEY A$
30 PRINT A$
40 GOTO 10
```

Don't forget the semicolon at the end of the first PRINT statement.
Andre Leduc
Ontario, Canada

CAPS LOCK reader: To read the position of the 128's CAPS LOCK key, use:

```
C = PEEK(1) AND 64
```

If C=0 then the CAPS LOCK key is down; if C=64, then it is up.
Daihung Ho
East Moline, Illinois

Continued from pg. 60

right protection to "the look and feel" of a program.

"We are off on an overbroad course," contends attorney Julian Millstein of Brown, Raysman & Millstein in New York and editor of the *Computer Law Strategist*.

The legal battle over appropriate copyright protection for software has been joined—and, unfortunately, in what has always been copyright's weakest area—by the fact that factual works must be distinguished from fictional works. The range of possible expression in works of history and biography, as well as computer programs, is more limited, so that any broadening of the copyright monopoly in these areas has far greater consequences. There are only so many ways to tell the story of Pearl Harbor, and likewise, only so many ways to create a spreadsheet program.

Attorney G. Gervaise Davis III of Monterey, California, and author of *Software Protection* fears "serious negative repercussions for the software industry."

But while legal scholars joust (a number of "structure" cases are currently in the courts)—realistically the battle will go on for years.

The users, of course, find themselves caught in the middle. Simply put, they want as much software as possible and at competitive prices. And when buying (or using) hardware, they want broad availability of software. But, if that first protection is not adequately defined, further software developments could be inhibited and state of the art advances may be subject to stagnation.

The problems resulting from this can be very real. For example, software vendors from now on will no doubt be more eager to sell their products rather than license them, since a sale under boilerplate terms will limit users more than provisions that might run with a license, particularly if the license has to be individually negotiated. In any case, even with a license, vendors can now be tougher negotiators.

Users, too, face their own paradox. A software copyright is now more valuable than ever. Users may adapt (or create) something new in software, something for which they can secure their own copyright. Yet all the time, effort, and expense involved can go for naught— even bring a lawsuit—if what users develop on their own is deemed too close to pre-existing software. On the one hand, a developer might be able to sell a business (for more), make a loan, or make sales based on a copyright. But on the other hand, he might be looking at huge legal bills to defend himself.

Then too, there are issues of "scope of employment" and "work for hire." Under The 1976 Act, the creator/author of a work owns the copyright in it—unless these previous two doctrines apply. As a result, their application, or the lack of it, is now more important than ever.

And similarly so if two creators or authors work together. The product at bottom has been jointly developed—ownership of the copyright is not clear. Each will soon be off to his own lawyer.

Even the simple act of buying a computer or software must now be considered more complicated. How is a purchaser to know that what he is getting will not someday be stricken from the marketplace because a copyright infringement has taken place? No certainty is possible and the question lapses over into possible scenarios of contributory/copyright infringement.

Litigation is the last thing a user should have to concern himself with when buying, licensing, adapting, creating, using or developing software. Likewise for hardware. But this can no longer be said.

But there is one bright light to all of this that copyright law still provides. If a person sat down, and never having heard of or read Shakespeare, wrote *Hamlet*, that would not be copyright infringement for the simple reason that it is not copying. It is, indeed, independent creation, which copyright permits.

In the computer universe, this is known as the doctrine of "clean rooms." A second creator creates with no knowledge of the first work. And by law, the first copyright holder does have the burden of showing that the second creator had "access" or "used" the first work in the subsequent creation.

But the downside to this is twofold, pointed out by attorney Ronald Lourie of Townsend & Townsend in San Francisco. Each subsequent author is put to the trouble of, in effect, reinventing the wheel. And he probably has to work with a lawyer every step of the way, hardly an inconsequential or inexpensive burden.

Users can only hope that courts will soon sort out workable definitions of "structure," "expression," "idea," "function" and "substantial similarity." But the wait could be very long, and in some instances, just plain costly. C






BY TIM JONES

AmigaBASIC Tutorial

Part 5: Animation & BOBs

A short program demonstrates difficult areas of AmigaBASIC, offering both tips on confusing areas and tricks to make your life easier. Rather than an article followed by a program, we have combined them for the sake of clarity.

```
REM AmigaBASIC (Microsoft) Tutorials
REM Installment #5
REM (Animation & BOBs)
REM Tim Jones AmSoft Development
' This file assumes that you are familiar with the previous
' information that has been covered with these tutorials.
' Please review the first four installments if you have any
' questions.  Discussion:
' This section is less a part of a program than it is just
' a general discussion of the various aspects of AmigaBASIC
' animation.  First, animation in AmigaBASIC is performed
' via calls to a set of OBJECT commands.  The following
' list describes these commands and what is achieved by
' using them.  If you wish to speed up execution of the
' examples, delete ALL of the remarks.
' OBJECT.SHAPE objectid, definition
' This defines what your object (BOB or sprite) will look
' like.  The objectid is the number that you are assigning
' and the definition is usually a string containing the
' definition data.
' OBJECT.X objectid, xlocation
' OBJECT.Y objectid, ylocation
' These define the location at which your object, as defined
' in OBJECT.SHAPE, will appear.  X is the horizontal location
' based on the left edge of the display and Y is the vertical
' location based on th etop edge of the display.
' OBJECT.ON objectid [, objectid, objectid, ...]
' OBJECT.OFF objectid [, objectid, objectid, ...]
' These are used to actually control whether an object is
' actually shown.  You may switch more than one objectid
' by using commas to seperate the values
' OBJECT.CLIP (x1,y1)-(x2,y2)
' This allows you to define an area of your display outside
' of which AmigaBASIC will not draw any objects.  This is
' useful for creating a 'Porthole' or 'cockpit' style view
' in your applications.
' OBJECT.CLOSE objectid [, objectid, object, ...]
' This will shut down any objects and free up any memory
' that was used by it.  You may close more than one objectid
' by using commas to seperate the values.
' OBJECT.VX objectid, speed
' OBJECT .VY objectid, speed
' OBJECT.AX objectid, acceleration
' OBJECT.AY objectid, acceleration
' These are the commands you will use to control the speed
' of your objects on the screen.  The VX and VY commands
' set a constant velocity for your object in either the X
' or Y directions.  A positive speed value moves the object
' in the right or down direction while a negative value
' moves it in a left or up direction.  The value of speed
' is in pixels per second.  The AX and AY commands are
' used to set an acceleration level.  if the acceleration
' values are positive, the object will speed up while
' negative values slow it down.  The value of acceleration
' is in pixels per second per second.
' OBJECT.START objectid [, objectid, objectid, ...]
' OBJECT.STOP objectid [, objectid, objectid, ...]
' These are used to set the objects in motion (assuming the
' VX, VY, AX and AY values have been set as required).  You
' may start or stop more than one object by seperating the
' objectid's with commas.
' OBJECT.HIT objectid [, memask] [, hitmask]
' This one is used to tell the low-level animation routines
' what other items this particular object may collide with
' and result in a collision event.  memask and hitmask are
' described more fully in the examples below.
' OBJECT.PLANES objectid [, planepick] [, planesonoff]
' This is used to set the planes in which a BOB is displayed.
' by altering this, you can change the default colors of your
' BOBs.  This allows you to create a BOB in any set of colors
' and then change them in your application without redefining
' the entire structure.  planepick and planesonoff will be
' described more fully in the examples below.
' OBJECT.PRIORITY objectid, priority
' When using BOBs, this command allows you to decide which
' object will be displayed in front of another.  The higher
' values will always be drawn in front of lower priority
' objects.  For example, a priority 200 object will be
' drawn in front of a priority 87 object.  If two objects
' have the same priority, they are drawn in a random
' arrangement.
' OBJECT.CLOSE objectid
' This frees up all memory that was being used to store info
' about the specified objectid.
' One note that applies to all OBJECT commands, if NO
' objectid is specified, the command will apply to all
' currently defined objects.
' Now we will examine these commands in useScreenWindow:
WINDOW CLOSE 1 SCREEN 1,320,200,5,1
WINDOW 2,"",(0,0)-(311,186),0,1
Initialize:
' We will read in the data from a BOB (Blitter OBject)
' that was created and then translated into HEX data.
COLOR 7 : PRINT "Reading BOB Data..."
GOSUB Bob1
OBJECT.SHAPE 1,Saucer$
CLS
ObjectAnimation:
' Now we'll preset the X and Y starting points, the initial
' X and Y velocities and the acceleration levels.
OBJECT.X 1,0 : OBJECT.Y 1,75
OBJECT.VX 1,5 : OBJECT.VY 1,0
OBJECT.AX 1,1 : OBJECT.AY 1,0
' Let's turn it on and put it in motion. Run it to the edge,
' then shut it down.
OBJECT.ON 1 : OBJECT.START 1
WHILE OBJECT.X(1) < 270 : WEND
OBJECT.STOP 1 : OBJECT.CLOSE 1
LOCATE 22,1 : PRINT "Any key continues..."
WHILE INKEY$ = "" : WEND
CLS
PutAndGetExample:
' If you noticed the jerking of the bob during the movement,
' we will now look at another method of motion control using
' PUT and GET, vice the OBJECT commands.
' We'll build a simple box and run it across the screen using
' PUT and a for next loop. First, we need to set up an array
' into which to store the data.  You can figure the size of
' this array using the following formula:
size% = 3 + INT((30 + 16)/16) * (12 + 1) * 5
' this comes out to 133 in our 30 x 12 x 5 sample.
DIM array%(size%)
COLOR 7 : LINE(1,12)-(30,12)
LINE(1,1)-(29,10),9,bf
LINE(2,2)-(28,9),0,b
GET (1,1)-(30,12),array%
CLS
LOCATE 15,1 COLOR 5
PRINT "Using PUT, we get a flickering, but smooth"
PRINT "motion from our object."
' If we want to, we could make the array a multidiminsional
' one, which allows a single array name to handle a series of
' shapes.  This will make it easier for a programmer to keep
' track of his shapes in a motion-picture style multi-image
' shape.  This form of animation will be covered in a future
' installment.
' Now, we'll perform a for-next loop and duplicate the motion
' that was shown in the previous example.
FOR xPos = 1 TO 300
PUT(xPos,75),array%   ' draw the picture
PUT(xPos,75),array%   ' overwrite it to erase it
NEXT xPos
LOCATE 22,1 : PRINT "Any key continues..."
WHILE INKEY$ = "" : WEND
CLS
' Due to the manner in which PUT prints to the screen, the
' second PUT will 'DELETE' the initial one.  This causes the
' flicker that you see using this type of animation.
' Therefore, you find yourself giving up jerky motion for
' flicker and vice-versa.
' The other difference is the fact that the OBJECT commands
' handle ALL animation for you while you must do ALL of the
' motion, acceleration and collision checking yourself.  This
' means a  higher overhead in final code.
' Another method of moving items on the screen is with the
' SCROLL command.  SCROLL uses the following syntax:
' SCROLL(x1, y1)-(x2, y2), xScroll, yScroll
' x1, x2, y1 and y2 are the corner coordinates of the area
```

AMIGA UPDATE/AMIGABASIC TUTORIAL

```
' you wish to scroll.
' xScroll and yScroll are the actual pixel
' amounts that you wish to move the section of screen.
' Let's take a look at some effects of scrolling portions of
' the screen.
ScrollExample:
LINE(1,1)-(30,12),8,bf
LINE(2,2)-(29,11),4,b
ERASE array%
' so we can reDIM it for this round
DIM array%(size%)      ' we'll borrow this from above
GET(1,1)-(30,12),array%
COLOR 0,9 : CLS : COLOR 1
LOCATE 21,1 : PRINT "Any key to continue..."
WHILE INKEY$ = ""
PUT(3,70),array%
FOR Distance = 1 TO 30
SCROLL(3,70)-(300,110),6,0
NEXT Distance
WEND
CLS
Finish:
LOCATE 23,1 : PRINT "Any key continues..."
WHILE INKEY$ <> "" : WEND
WHILE INKEY$ = "" : WEND
WINDOW CLOSE 3 : WINDOW CLOSE 2 : SCREEN CLOSE 1
WINDOW 1,"Basic",(0,0)-(617,186),31,-1
END
Bob1:
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,&H00,
     &H00,&H04
DATA &H00,&H00,&H00,&H1E,&H00,&H00,&H00,&H0E,
     &H00,&H18,&H00,&H0F
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,
     &H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,&H00,
     &H3F,&HF0,&H00,&H00,&HC0
DATA &H0C,&H00,&H03,&H00,&H03,&H00,&H0C,&H00,
     &H00,&HC0,&H30,&H00
DATA &H00,&H30,&HFF,&HFF,&HFF,&HFC,&H60,
     &H00,&H00,&H18,&H1E,&H00
DATA &H01,&HE0,&H01,&HE3,&H1E,&H00,&H00,
     &H1C,&HE0,&H00,&H00,&H1F
DATA &HE0,&H00,&H00,&H0F,&HC0,&H00,
     &H00,&H1F,&HE0,&H00,&H00,&H04
DATA &H80,&H00,&H00,&H00,&H00,
     &H00,&H00,&H3F,&HF0,&H00,&H00,&HFF
DATA &HFC,&H00,&H01,&H54,&HAA,&H00,&H0F,
     &HFF,&HFF,&HC0,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,
     &H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,
     &H00,&H00,&H00,&H00,&H00,&H00
DATA &H00,&H00,&H00,&H00,&H00,&H00,
     &H00,&H00,&H00,&H00,&H00,&H3F
DATA &HF0,&H00,&H00,&HFF,&HFC,&H00,&H03,
     &HFF,&HFF,&H00,&H0F,&HAB
DATA &H57,&HC0,&H3F,&HFF,&HFF,&HF0,
     &HFF,&HFF,&HFF,&HFC,&H7F,&HFF
DATA &HFF,&HF8,&H1F,&HFF,&HFF,&HE0,
     &H01,&HFF,&HFE,&H00,&H00,&H1C
DATA &HE0,&H00,&H00,&H1F,&HE0,&H00,
     &H00,&H0F,&HC0,&H00,&H00,&H1F
DATA &HE0,&H00,&H00,&H04,&H80,&H00,
     &H00,&H3F,&HF0,&H00,&H00,&HC0
DATA &H0C,&H00,&H03,&H00,&H03,&H00,
     &H0E,&HAB,&H55,&HC0,&H30,&H00
DATA &H00,&H30,&HFF,&HFF,&HFF,&HFC,
     &H60,&H00,&H00,&H18,&H1E,&HAB
DATA &H55,&HE0,&H01,&HE3,&H1E,&H00,&H00,
     &H1C,&HE0,&H00,&H1E
FOR BobCnt = 1 TO 250
READ BobStr%
Saucer$ = Saucer$ + CHR$(BobStr%)
NEXT BobCnt
RETURN
' If you have any comments or corrections, I can be contacted
' on QuantumLink as SigBit and People Link as AmSoft 1.
' If you like to call Amiga BBS's, I can also be reached at:
' ZeitGeist BBS      (516)-689-3105  Amiga BBS-PC (NY)
' IDCMP BBS          (617)-769-8444  8pm-8am (Boston)
' Most FIDOs supporting Amiga EchoMail
' All as Tim Jones
```

END

BALANCE OF POWER

Continued from pg. 42

cess of and acting upon the variables of the simulation is easy to do—you simply point, examine and respond. Of course, for the world's sake, hopefully you think before you act.

The graphics used by *Balance of Power* are excellent and all you would expect to see on an Amiga screen. The boundaries of the countries are well defined and easy to recognize. The game is void of sound, which I thought sensible since neither noise nor music would contribute to the realism of the play.

The simulation can be played either solo or against another player. The solo game is tough even at the entry level (levels include beginner, intermediate, expert and nightmare). The computer assumes control of whichever country you choose for it—Russia or the U.S. I found the two-player option much easier, since I could adjust my responses according to what I know about the fellow sitting next to me (sort of like high-stakes poker).

I must confess that I have not progressed beyond the entry level except for a few peeks. And I totally agree that level four is properly labelled—nightmare. There is an option to save the game in progress, so you don't have to finish the simulation in a single sitting.

Unfortunately, at the end of an unsuccessful round with the program, you are forced to repeat the entire loading process to play again, because a play again option is not included. Apparently, this is programmer Crawford's punishment for those who fail to keep world peace.

I was also surprised that on the world map Central America showed only Mexico, Honduras, Nicaragua, and Panama, while some of the other hot spots like El Salvador and Costa Rica were missing. I suspect the reason was size limitation of screen display. Fortunately, he did manage to include most of the more important small countries like Israel, Taiwan, and the two Koreas.

By now you know that this is not an arcade game. If you are looking for a shoot-'em-up space game, competition between wizards and warlords, or a simple game to escape the worries of the world for awhile, this is definitely not your game. This program forces the player to think, consider, and think again before making a decision. It is wonderful if you are looking for a mental workout or lean toward chess-type competition.

I suspect *Balance of Power* will most often appear in the homes of people who are keenly aware of the sensitive nature of international relations. It is one of the few programs I've seen which puts the computer's power to work to project serious what-if scenarios which may parallel next week's headlines. The group I would really like to see sit down and play the game, though, are politicians.

Crawford wasn't finished when he placed the last piece of code in the program. Next he wrote a 307-page book called *Balance of Power: International Politics as the Ultimate Global Game.* The book offers insight and tips into not only the game but the political make-up of the world as well. The book, like the simulation, is a serious study which will grab the attention of those who thrive on international dealings, schemes, politics and conflict. It is published by Microsoft Press (16011 Northeast 36th, Box 97017, Redmond, WA 98073).

THE INSIDE TRACK

Continued from pg. 63

crack at it, but it's up to the person submitting the product. Some people send in ads they've designed or letters they have received from other publishers they've submitted the product to.

Lehrberg: I've had products submitted with a videotape of game play. That can be helpful if there are higher levels of play that take hours to get to.

I'm sure you're all wondering what happens to your program once you've sent it in. Each publisher gets about 30 to 50 submissions each month, and they look at every one. Many times, each program is looked at by more than one person. In most cases, a written critique is made by each evaluator.

Collis: Once it comes in, I initially screen it. Then we have an editorial meeting once a week where everyone looks at the products that I've passed. If there is an interest, we evaluate it further. A lot of people will look at the program to give their input.

Manley: When a program first comes in, I'll look at it. If it's good, I'll pass it on to someone in the company who has an interest in that type of software and ask them to evaluate it. They use a software evaluation prompt sheet so that we get written evaluations. We want positive and negative feedback. I'll make sure that every product that comes in gets at least one evaluation.

If your program does not pass muster, don't give up hope. The feedback you get from the evaluation process can be used to improve your work, and you can always resubmit it.

Collis: Sometimes something comes in and it looks like it has potential, but it needs design work or graphics added, and we might not have the resources at that time to develop it further in-house, so we send it back with encouragement and suggestions.

Manley: If we decide to pass on a program, I'll contact the author and explain why. I will give them a list of the features we enjoyed and the potential it has. Generally it's the implementation that needs working on. I'll give them a list of constructive criticism as to what we feel would enhance the product or what we feel the potential of the product is.

Lehrberg: One of the producers or one of the product development people has to champion the product. If no one champions the product, it's very unlikely that it would get published.

If your program is chosen, one of the few to make it past the scrutiny of the product development and software producers who will carry the burden of seeing your program through the total development cycle, what's next?

Collis: If we decide to go with it, we start negotiations with the author. We take it on in-house. If it's not finished, we'll finish the development. There are certain trademarks that Broderbund has in its products and we may add some graphics or other features.

Lindsey: Let's assume we want the program. At that point we like to bring the programmer into the fold. We want to raise their expertise for the next product they produce. Hopefully, Epyx will be the beneficiary of that expertise, but we don't require it. It becomes a joint venture, really. We have other tools and utilities they can use to improve their product, to eliminate problems.

There are other ways to get your program accepted, but they are mostly a matter of being at the right place at the right time.

Manley: Ray Tobey ran into Steve Wozniak at a CES show and showed him his flight simulator. Wozniak wrote a note to Trip Hawkins, president of Electronic Arts, on the back of one of his business cards saying "This is the best flight simulator I've ever seen" and signed The Woz. He said to take this to Trip Hawkins and tell him I sent you. That's how we got *Skyfox.*

The basic steps are simple: come up with a program that's new and different, research the market, send away for the artist's submission kits, follow their instructions, and keep your fingers crossed. Software publishers are eager to see your latest work, but they expect you to take the time to present it in a professional manner.

There are several publications that list software publishers. One of the best is *Writer's Market.* You can also find addresses for many software publishers in this magazine.

As to why publishers look at so much software from new programmers, just ask Lehrberg: "You have to kiss a lot of frogs to find a prince." ■

Continued from pg. 48

SHORTCOMINGS:

No printer support

Dual-disk capabilities are not properly taken advantage of for best speed in compiling programs

Slower-executing code than *BASIC 128* or *PetSpeed*

Gnome Speed
(Kira Corporation)

Gnome Speed is kind of the underdog here, coming from a smaller company that doesn't have the same well-known Commodore background as Abacus, Skyles Electric Works or Oxford (the British company that created *PetSpeed*). And *Gnome Speed* lives up to its underdog status— it is quite a bit slower than its competition (in both compiling and execution time). However, it does have several features not found in the others.

For one, *Gnome Speed* isn't copy protected, a gutsy choice for which Kira Corporation should be applauded. Even the most unobtrusive forms of copy protection become irritating eventually. Without the copy protection, you're free to move copies of *Gnome Speed* onto all your different source program disks, perhaps putting a stop to the where's-the-compiler-disk hunt I usually struggle with!

I was surprised that *Gnome Speed* was the only BASIC compiler for the 128 that supports using the printer for listing errors as it finds them. This is much superior to just a cryptic line number listing, especially since screen messages have a bad habit of scrolling off the screen while you're in the kitchen getting a soda.

Another unique feature of *Gnome Speed* is that by using an imbedded compiler directive you can tell the compiler to print a list of all simple and array variables to the disk drive, which you can later DLOAD and inspect. Yet another directive allows you to specify exactly in memory where you want a variable to be saved—a real boon for machine-language routine programmers!

BASIC 128, Blitz! and *PetSpeed* all automatically append their run-time modules to the end of the compiled programs, so you don't have to load any other files separately. *Gnome Speed*, however, requires that you first manually poke a memory location to protect the run-time module from being overwritten in memory, then BLOAD the run-time module before you can load and run the compiled program. This is quite inconve-

COMMODORE 128 BASIC COMPILER COMPARISON CHART

	BASIC 128	BLITZ!	GNOME SPEED	PETSPEED
Price	$59.95	$59.95	$59.95	$49.95
Compiles all BASIC commands	Yes	Yes	No[1]	Yes
Copy Protection	DOS	Dongle	None	Optical
Can have compiler on sourcecode disk?	No	Yes	Yes	Yes[2]
Supports printer?	No	No	Yes[3]	No
Supports two disk drives?	No	Yes[4]	No	No
Speed Optimization	From menu or imbedded directives	Imbedded directives	Some integers	Auto[5]
Running Time for "Sieve of Eratosthenes" (Program 1, Unmodified) >> BASIC time: 18:15	5:19 (P-code) 4:36 (6502)	5:55	7:56	5:08
Running Time for "Sieve of Eratosthenes" (Optimized code)	4:37 (P-Code) 3:56 (6502)	4:59	7:41	5:08
Running Time for Program 2 (strings) (Unmodified code) >> BASIC time: 5:16	1:23 (P-code) 1:11 (6502)	1:53	3:08	1:08
Running Time for Program 2 (strings) (Optimized code)	1:02 (P-Code) 0:50 (6502)	1:23	3:06	1:08
Compile time for 79 Block Program [Compiled Blocks]	11:30[6] [80] 17:18 [119] (6502)	10:15[7] [84]	24:30 [60][8]	15:05 [92]
Compile time for 175 Block Program [Compiled Blocks]	35:05[6] [184] [Failed] (6502[10])	29:50[7] [151]	1:35:15 [166][8]	Failed[9] [ ]
Need Runtime Module on user disk?	No	No	Yes (but must load separately)	No
Allows extensions to BASIC?	Yes	Yes	No	Yes

NOTES:

[1] GNOME SPEED doesn't compile several commands like TRON/TROFF, GO 64, MONITOR that are unlikely to be used in a compiled program.

[2] Must transfer several files; it would be easier to copy your sourcecode onto the compiler than the other way around!

[3] BASIC syntax errors found during compilation may optionally be sent to the printer.

[4] BLITZ! allows use of either dual drives (0 and 1) or drives 8 and 9. However, compile time is just as long with two drives, negating most of the advantage.

[5] PetSpeed always optimizes the P-Code for speed, using integers wherever possible. All attempts at further optimization yielded the same results.

[6] Compiled to P-Code, line-number option turned off.

[7] Compiled on single drive, line-number option not used. When compiled using two drives (8 and 9), time was exactly the same.

[8] Block length does not include 49 block runtime module, which must also be included on the disk. Also note that while the longer program (175 block) did make it through the compiler, the compiled program was much too large to run.

[9] Repeated attempts to compile this program never got past Pass One. A 1541 drive was tried in place of the 1571, again with no results. (All of the compilers occasionally had problems with long sequential files on my very early version 1571 drive.)

[10] Program was too large to compile with the 6502 machine-code option selected. (Note the increased program size for the 79-block code above.)

nient, and make uploading and downloading *Gnome Speed* programs by modem difficult. Of course, there is a plus side to *Gnome Speed*'s method: the shorter compiled programs take up far less space on the disk than the same programs compiled with the other compilers, so you can fit more programs and data files on a single disk, with only one copy of the run-time module. But, somewhat inexplicably, the longer programs take up more disk space when compiled by *Gnome Speed*, and the 49-block run-time module needs to be BLOADed on top of that.

NICE FEATURES:

- Compiler is not copy protected
- Separate run-time module allows more (shorter) programs on disk
- Telephone support offered by Kira Corporation
- Compiler can create variable list on disk
- Supports RESUME NEXT
- Allows programmer to specify specific address for a variable
- Handles BASIC relative coordinates for graphic commands

SHORTCOMINGS:

- Slowest compiler tested, both in compiling and executing code
- Separate program or keystrokes required to BLOAD run-time modules
- Doesn't beep when finished compiling

Petspeed (Progressive Peripherals & Software)

The *PetSpeed* compiler produces very fast-executing code, second only to the machine-code operations of *BASIC 128*. *PetSpeed* automatically does the integer-conversion and related speed optimization that the other compilers require the programmer to do. When finished, it displays a list of statistics for the compiled program; including the number of lines, simple variables and arrays, and the amount of memory used by the P-Code. This is a nice touch.

PetSpeed stores simple (non-array) variables in Bank 0. Unlike *BASIC 128*, however, it tries to store all of the simple variables there, instead of just those that will fit. That's probably why *PetSpeed* was the only compiler that failed to compile my lengthy (175-block) game program, which uses lots of DATA statements and simple variables. *PetSpeed* compiled a 79-block long program in a little over 15 minutes; it took *Blitz!* a little over 10 minutes. If you write very long programs, you're probably going to need *BASIC 128* or *Blitz!*.

Although it compiles speedy code with a minimum of programmer-added extras, the ordeal of using *PetSpeed* itself is very frustrating. Most of the problem is the method of copy protection that Oxford chose to use. When you first boot up the program, *PetSpeed* asks you for the color found at a specified coordinate on a sheet of printed paper that accompanies the compiler, then you press a key for that color. *PetSpeed* repeats the question two more times. If all three colors are correct, the program proceeds.

PetSpeed nows asks for the filename of the file to be compiled, then proceeds to load the rest of the compiler's modules. Hopefully, you typed in the filename correctly—if you made a typo, *PetSpeed* will tell you that it couldn't find the file and reset the computer.

Besides a page and a half of instructions on how to work the copy protection, the *PetSpeed* manual contains lots of useful information on the format of a *PetSpeed*-compiled program, and the actual formats that variables are saved in (which is information more useful to programmers writing machine-language subroutines to work with *PetSpeed*).

Also included is information on some nice additions *PetSpeed* adds to BASIC. For instance, a special directive lets you use long variable names with every character significant (instead of only the first two as in BASIC 7.0). Another nice *PetSpeed* addition is the &F statement, which simulates an input-version of BASIC's CMD command, and allows much faster inputting of files from the disk when using the GET# command.

PetSpeed is a powerful BASIC compiler with some unique features. If it were made a little more user-friendly, it would be tough to beat at only $49.95.

NICE FEATURES:

- Compiles very fast code by automatically optimizing the program for speed
- Least expensive ($49.95)
- Beeps when compile is finished
- Copy protection method allows compiler and source code on same disk
- Allows user-defined string functions
- Allows long variable names with all characters significant
- Special "&" commands allow more rapid disk file reading and writing

SHORTCOMINGS:

- Copy protection method is annoying, especially for multiple compiles
- The compiler stops at the first syntax error found, instead of going on and listing all errors found
- *PetSpeed* was the only compiler that failed to compile the long (175-block) program, indicating that its memory reserved for DATA statements and simple variables was probably exceeded

Conclusions

All four compilers had some problems, but all four had nice features unique to themselves. It would be nice to get all of their programmers together and produce one compiler with all of the good and none of the bad—except that the meeting would have to be held in Europe! *PetSpeed* was produced in Great Britain, *Gnome Speed* and *BASIC 128* in Germany, and *Blitz!* in Austria.

Publishers

Basic 128
Abacus Software
P.O. Box 7211
Grand Rapids, MI 49510
(616) 241-5510
$59.95

Gnome Speed
Kira Corporation
P.O. Box 129
Kutztown, PA 19530
(215) 683-5699
$59.95

Blitz! 128
Skyles Electric Works
231 E South Whisman Road
Mountain View, CA 94041
(415) 965-1735
$59.95

Petspeed
Progressive Peripherals & Software
464 Kalamath Street
Denver, CO 80204
(303) 825-4144
$49.95

WORLD GAMES

Continued from pg. 40

of these eight contests is a feast for the eyes and ears. Aside from the evident effort put into capturing the details on the sporting side of these simulations, time was also invested into recreating the sights and sounds that surround each event. The nearby landscapes, the athletes' garb, and the size and arrangement of the attentive audience is all suited to the particular event and its location. The bull rider, backed by the twangs of a country beat, miraculously stays glued under his cowboy hat as he bucks his way across a dusty arena lined by rowdy rodeo grandstanders. On a Canadian shore, an orderly crowd of onlookers sit patiently as the woolen-capped flannel-jacketed grizzly log rollers do their dance to a synthesized version of "I'm a Lumberjack." And in the solitude of a Mexican cliff, a scantily suited diver courageously pushes off on a death defying descent witnessed by no one except a slightly amused neighboring pelican.

There is realism, like all of the skiers taking the time to dig hard and plant their poles before springing from the starter's shack, as well as humor, like an unsuccessful caber tosser hopping starter's shack, as well as humor, like an unsuccessful caber tosser hopping around after an ill-timed attempt backfires and bashes his foot. It's an absolutely delightful combination, with the creative, light-hearted atmosphere balanced against the competitive core of a truly demanding recreational exercise. The mix works well, delivering a serious challenge that doesn't have to be serious.

As usual, Epyx ties all the events together with the customary post-game awarding of medals, climaxed by a conclusive Grand Championship Ceremony honoring the top gold-getter. All the expected extras are present. Up to eight players can compete, choosing to represent any of 18 countries. A World Records vanity board is kept on disk, practice rounds can be arranged, and the number of events can be tailored to taste.

World Games is highly recommended entertainment for armchair athletes of all ages. The larger the participating audience the better, for this is a true crowd pleaser. ■

World Domination

This is one of those contests where it pays to spend some time studying the instruction manual. It's the perfect coaching tool, complete with precise instructions, scoring tips and strategies for each event. Read it over a couple of times and you'll be off and running on the right foot. To provide a little added assistance, I've outlined a few more tips to help get you on top of the world.

After you leap from the cliff in Acapulco, the quicker you can get out of the swan position and into a vertical dive, the higher your final score will be. For best results, position yourself at the uppermost ledge of the cliff and jump off just as the water level below begins to recede from its highest point. If you push off hard to the left, you should be able to extend your body to the desired diving position almost immediately. Your surrogate will then quickly shoot down, entering the basin with the water level again reaching its highest level.

NOTE: There will be some instances where a very strong wind will force you to hold the swan a little longer. Be careful, lest you be pushed against the rocks during your descent.

To successfully handle the heavier lifts in the weightlifting competition, it helps to break the joystick movements down into separate stages, each consisting of one back-and-forward combination. A short resting period is advisable between these stages, with the length of the break decreasing as the weights increase.

To view a hilarious bit of slapstick animation (that won't take any points away from your score), keep the barbell hoisted above your athlete's head even after the judges vote the lift a success. Then watch and wait. What goes up...

When you are in danger of losing your balance in a log rolling duel, one way to re-establish your footing is to continuously tap the shaft of the joystick in the opposite direction of the moving gauge on the balance meter. This technique is not mentioned in the manual and offers an alternative to the instructed (and thus predictable) method of slowing down and reversing the spin on the log.

As any skier will tell you, it actually becomes easier to cut quick, sharp turns across a slope when you can put a little speed behind your moves. While I don't suggest that you set an out-of-control suicidal pace in the slalom skiing competition, you'll find it easier to develop a gate-splitting rhythm once you pump a little hustle in your muscle. ■

Continued from pg. 17

For the 64 PB = 56577

For the 128 PB = 56577

If you are using a 64 or 128 with only circuit A, type in this additional line:

55 S = 54272:FORL = 0TO24:POKES + L,0:NEXT:
POKES + 24,15

When run, the computer should say hello. Adjust the trimmer pot if you're using the entire circuit and have included the pot in the circuit. If the computer fails to speak, you have either a typing error in the program or a wiring error in the circuit. Check over the program to see if you entered it correctly. Recheck your wiring. If everything checks out okay, verify circuit operation by checking for clock pulses at pins 27, 28, and 24. If you show pulses, the problem is in the audio section.

Although it isn't necessary to understand how the program operates to use it, a brief description follows.

Lines 60 to 100	Sets up Data Direction Register and allophone table
Lines 150 to 157	Speech Module reads speech in program
Lines 10000 to 10065	Subroutine sends instructions to speech chip and returns

Until you gain some experience and feel comfortable designing your own speech program, lines 150 to 157 is the model to use to program speech in your BASIC programs. A line-by-line analysis and an example will insure a good understanding of the procedure.

Line 151 A REM statement labeling the word or phrase contained in the following DATA statements. This is useful in the event you wish to correct, change or eliminate words. By clear labeling you can locate the word quickly.

Line 152 Data statement. Contains allophones for the word hello.

Line 153 Counting line. Enables the computer to read the proper number of allophones in the DATA statement then jump to the end of the speech module upon completion. G = (number of allophones) + 1. Therefore, if our word uses 6 allophones, then G = 7. If a sentence uses 31 allophones, then G = 32.

Line 154 Reads allophones in data statement.

Line 155 Takes data read; jumps to subroutine line 10000. There computer compares to table, decodes, and provides necessary electrical pulses to the speech chip; returns.

Line 156 Return program to counting; incrementing G; reading the next allophone. Process is repeated until G equals its assigned value.

Line 157 Line number called in line 153 (then 157); resets G to 0, enabling G to be used again in other modules of the program.

Example

The booklet provided with the chip has a dictionary with over 200 words, with their proper allophone data. These words can be put into your programs at once. Some of the words included are numbers 0 to 1,000,000, days of the week, months, letters, and common words. In our example we will construct a sentence concatenating 4 words and entering it in our program.

Delete lines 150-162 from the program HELLO and replace them with the following.

```
200 REM SEE YOU NEXT TUESDAY
201 DATA SS,SS,IY,PA1
202 DATA YY1,UW1,PA1
203 DATA NN1,EH,KK1,SS,TT2,PA1
204 DATA PA1,TT2,UW2,ZZ,PA2,DD2,EY,PA1
```

The REM statement describes what is contained in the following data statements. You can use or start with any line number you'd like, just remember to be consistent.

```
205 LET G=G+1:IF G=22 THEN 225
```

Count the allophones in the above DATA statements. You should count 21 allophones. Since G = (# of allophones) + 1 therefore G = 22. Note line number 225 call out <Then 225> in this line, it marks the end of the speech module. You can easily predict this number since it is always four lines down from this line.

```
210 READ A$
```

Reads allophone in DATA statement.

```
215 GOSUB 10000
```

Program goes to subroutine at line 10000.

```
220 GOTO 205
```

When program returns from subroutine, this line returns program to line 205, the counting line. G is incremented, next allophone is read, until G equals its assigned value.

```
225 G=0
```

This is the line called when G reaches its assigned value. This line resets G to 0 so it can be used again for other speech modules.

ALLOPHONE ADDRESS TABLE

DECIMAL ADDRESS	ALLOPHONE	SAMPLE WORD	DURATION	DECIMAL ADDRESS	ALLOPHONE	SAMPLE WORD	DURATION
0	PA1	PAUSE	10MS	32	/AW/	Out	370MS
1	PA2	PAUSE	30MS	33	/DD2/	Do	160MS
2	PA3	PAUSE	50MS	34	/GG3/	Wig	140MS
3	PA4	PAUSE	100MS	35	/VV/	Vest	190MS
4	PA5	PAUSE	200MS	36	/GG1/	Got	80MS
5	/OY/	Boy	420MS	37	/SH/	Ship	160MS
6	/AY/	Sky	260MS	38	/ZH/	Azure	190MS
7	/EH/	End	70MS	39	/RR2/	Brain	120MS
8	/KK3/	Comb	120MS	40	/FF/	Food	150MS
9	/PP/	Pow	210MS	41	/KK2/	Sky	190MS
10	/JH/	Dodge	140MS	42	/KK1/	Can't	160MS
11	/NN1/	Thin	140MS	43	/ZZ/	Zoo	210MS
12	/IH/	Sit	70MS	44	/NG/	Anchor	220MS
13	/TT2/	To	140MS	45	/LL/	Lake	110MS
14	/RR1/	Rural	170MS	46	/WW/	Wool	180MS
15	/AX/	Succeed	70MS	47	/XR/	Repair	360MS
16	/MM/	Milk	180MS	48	/WH/	Whig	200MS
17	/TT1/	Part	100MS	49	/YY1/	Yes	130MS
18	/DH1/	They	290MS	50	/CH/	Church	190MS
19	/IY/	See	250MS	51	/ER1/	Fir	160MS
20	/EY/	Beige	280MS	52	/ER2/	Fir	300MS
21	/DD1/	Could	70MS	53	/OW/	Beau	240MS
22	/UW1/	To	100MS	54	/DH2/	They	240MS
23	/AO/	Aught	100MS	55	/SS/	Vest	90MS
24	/AA/	Hot	100MS	56	/NN2/	No	190MS
25	/YY2/	Yes	180MS	57	/HH2/	Noe	180MS
26	/AE/	Hat	120MS	58	/OR/	Store	330MS
27	/HH1/	He	130MS	59	/AR/	Alarm	290MS
28	/BB1/	Business	80MS	60	/YR/	Clear	350MS
29	/TH/	Thin	180MS	61	/GG2/	Guest	40MS
30	/UH/	Book	100MS	62	/EL/	Saddle	190MS
31	/UW2/	Food	260MS	63	/BB2/	Business	50MS

The allophone table correlates each allophone with its approximate sound. This table is essential for programming words that aren't in the provided dictionary. Please be aware that there are a few typographical errors in the dictionary, such as the following words Hello—HH,EH,LL,AX,OW,AW,ER1 and Computer—KK1,AX,MM,PP1,YY1,UW1,TT2,ER.

In the word hello, the first allophone HH doesn't exist in the table. You should use HH1 or the word will sound like *ello*. In the word computer, the last allophone ER doesn't exist. You

must use ER1 or the word will sound like *compute*, not computer.

Therefore, if you use a word from the dictionary that doesn't sound correct, first check the allophones to see if there is a typo.

Always end a word or phrase with one of the pauses PA1 to PA5. This is necessary to stop the computer from enunciating the last allophone.

BASIC Crunch

BASIC can run the speech processor, but it is a little slow. One of the easiest ways to bring BASIC up to speed is to use multiple statement lines and eliminate all unnecessary REM's. Effective programming has been known to help also. Experiment by crunching the program as much as possible. I would do this one step at a time or you stand a good chance of crashing.

Machine language is very quick and ideal to use with the circuit. It would require too much space to include such a program in this article. But if you're a machine-language programmer, here is an opportunity to test your mettle. I advise running a machine-language wedge and implementing a new BASIC command that would completely eliminate all BASIC programming.

Conclusion

You now have all the tools you need to program speech. To utilize the BASIC program into an existing program or to help organizing into a new program, think of the program as existing in three distinct modules: the data table, speech module and speech routine. Set up the data table before it will be used by the program. Put the subroutine for speech near the end of the program. The speech modules are placed anywhere in between where you want the computer to speak.

Examine the speech routine section of the program. With the knowledge and information given last time, you should be able to figure out how this program is operating. If you have any problem, you may want to place your LED's inline between the user port and speech synthesizer to observe the controlling bits. It'll definitely help.

What has been written in this installment are the bare essentials. Feel free to experiment and develop your own programs. ■

PARTS LIST

QTY.	DESCRIPTION	PART NO.	COST
1	SP0256-AL2	276-1784	$12.95
1	LM386	276-1731	$ 1.09
1	100K ¼ Watt Resistor	271-1311	$ .39
2	33K ¼ Watt Resistor	271-1341	$ .39
3	.1 UF Cap	272-135 2@	$ .49
2	.022 UF Cap	272-1066	$ .69
2	22 PF Cap		
1	100 UF Cap	272-1016 2@	$ .79
1	10K Trimmer Pot	271-335	$ .49
1	8 Ohm Miniature Speaker	40-245	$ 1.89
1	1 UF Cap	272-996	$ .79
1	10 UF Cap	272-999	$ .99
1	Experimenter's Board	276-168	$ 1.95
1	Card Connector 12/24 or Mod.	276-1551	$ 2.99
1	3.57 MHz Crystal	272-1310	$ 1.69

All parts are available from Radio Shack's 1987 Catalog.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

HELLO

VIC 20 users — eliminate the apostrophe and four letters at the end of each line.

```
20 REM *************************'BYBC
25 REM * VIC20        PB=37136 *'BPYG
30 REM * C64 & C128   PB=56577 *'BSMD
35 REM *************************'BYBI
50 REM SET UP DDR AND TABLE'BQCG
60 PB=56577'BHGE
65 POKE PB+2,191'CHDJ
70 DIM M$(63)'BGBE
75 FOR I=0 TO 63'DEJK
80 READ M$(I)'BFUF
85 NEXT I'BBCJ
90 REM ** DATA TABLE **'BNJI
91 DATA PA1,PA2,PA3,PA4,PA5,OY,AY,EH,
   KK3'BHDO
92 DATA PP,JH,NN1,IH,TT2,RR1,AX,MM,
   TT1'BFUP
93 DATA DH1,IY,EY,DD1,UW1,AO,AA,YY2,
   AE'BFQP
94 DATA HH1,BB1,TH,UH,UW2,AW,DD2,GG3,
   VV'BGVR
95 DATA GG1,SH,ZH,RR2,FF,KK2,KK1,ZZ,
   NG'BFZS
96 DATA LL,WW,XR,WH,YY1,CH,ER1,ER2,OW,
   DH2'BIBU
97 DATA SS,NN2,HH2,OR,AR,YR,GG2,EL,
   BB2'BFET
99 REM ** END OF SPEECH TABLE **'BUTT
145 GOSUB 10000'BFAF
150 REM ** SPEECH MODULE **'BQFE
151 REM HELLO'BFDD
152 DATA HH1,EH,LL,AX,OW,PA1'BTTH
153 G=G+1:IF G=7 THEN 157'FJII
154 READ A$'BCKE
155 GOSUB 10000'BFAG
156 GOTO 153 :REM RETURN TO COUNTING
    LINE'CYCN
157 G=0:REM RESET G'CJMK
158 REM CONTINUE MAIN PROGRAM'BTXO
159 PRINT"[CLEAR]"'BATK
160 PRINT"PROGRAM WOULD CONTINUE
    HERE"'BAKJ
161 PRINT"TYPE RUN THEN PRESS
    RETURN"'BACK
162 PRINT"TO DO AGAIN"'BATG
9999 END'BACD
10000 FOR I=0 TO 63'DEJS
10005 IF M$(I)=A$THEN GOSUB 10050
     :RETURN'FNIB
10010 NEXT I'BBCR
10015 RETURN'BAQW
10050 IF PEEK(PB)=128 THEN 10050'EMAB
10055 POKE PB,I'BEHC
10060 POKE PB,128'BGOX
10065 RETURN'BAQC
```

END

Continued from pg. 22

newer Newtronics model has a lever-type door and the older Alps model has a door that lifts straight up. With the Newtronics drive, the speed can be adjusted with no further disassembly. Simply reconnect the power and data cables to the drive **[WARNING: DANGEROUS VOLTAGES ARE PRESENT.]** and then load and run the Speed Adjustment Program which accompanies this article. (The program comes from *The 1541 Repair and Maintenance Handbook* with permission from Abacus Software, an excellent reference for anyone interested in more 1541 information.)

The program will ask you to insert a blank formatted disk, so have one ready. The disk will spin and the program will display the speed deviation from optimum in milliseconds (ms). You are shooting for 0 ms.

Turn the adjustment screw very gently with a small screwdriver and watch the screen for the results. When it reads 0 ms you are done. Hit F7 to stop the drive from spinning. Then disconnect the cables from the drive once again, and put a drop of nail polish on the speed adjusting screw. No, this is not to make it look pretty. The nail polish will harden and keep the screw from turning with the vibration of the drive motor.

If you own an Alps model drive, you have to dig a little deeper. Remove the six screws which hold the drive chassis to the bottom of the case. Carefully lift the chassis from the case and place it on edge on your worktable. Because the speed adjustment is on the bottom of the chassis, you have to find a way to secure it in this tricky position to work on it. I found that a couple of strategically-placed game cartridges worked well as a stand, but anything you can devise is fine. The chassis must be stable enough to spin without toppling over.

On the bottom of the chassis, you will see a round object with some strange markings on it. This is the strobe wheel. The theory behind the strobe wheel is that an ordinary florescent light is blinking on and off 60 times a second, the frequency of our alternating current. Although the strobing action is not visible to the naked eye, it is enough to make the markings on the wheel appear to stand still when the wheel is spinning. If the markings stand still, the speed is correct.

To adjust the speed on the Alps model, reconnect the power and data cables to the drive chassis which is now balanced on its side. **[WARNING: DANGEROUS VOLTAGES ARE PRESENT.]** You want the drive to spin for a long time, so either insert a program which takes a long time to load or a blank disk to be formatted.

After giving the appropriate command, look at the spinning strobe wheel under the illumination of a florescent light. You are interested in the outer row of markings. The inner row is for European countries which use 50 cycle-per-second current. If the markings in the outer row are moving more than a very slight amount, turn the adjusting screw gently with a small screwdriver until they are still.

Abort the load or format process from the keyboard and disconnect the power and data cables from the drive. Put a drop of nail polish on the adjusting screw and you are ready for reassembly.

Get It Together

There is really not too much to say about reassembly except to put everything back the way you found it. When it is all together, you will be ready for a test spin.

The best way to test the operation of your newly-tuned drive is with the performance test program on the test/demo disk that came with your drive. When you run this program, the drive will be put through its paces, reading and writing data on all parts of the disk. If the data it reads is the same as what the program wrote, the screen will display "PERFORMANCE TEST O.K."

Your drive is now purring happily like a kitten, ready for months more of reliable service. And you will rest easier knowing that your valuable data is in the hands of a clean drive with accurate speed. And best of all, it cost very little more than your time and attention. Now that is a good deal! ■

Reprinted with permission from *The 1541 Repair and Maintenance Handbook*, published by Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510.

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Speed Adjustment Program

```
1 REM:        SPEED ADJUSTMENT
  PROGRAM'BXFG
3 REM'BARB
5 REM'BARD
7 REM'BARF
10 POKE 53281,1:POKE 53280,1
   :PRINT CHR$(30)'EUQD
20 PRINT CHR$(147)'CFBA
30 OPEN 1,8,15'BGWA
40 PRINT"[SPACE3]"CHR$(18)"SPEED
   ADJUSTMENT PROGRAM"'CEMJ
50 PRINT'BACB
60 PRINT TAB(9)"PLEASE WAIT"'CCHG
70 FOR I=0 TO 161'DFGF
80 READ A:S=S+A'DFSH
90 PRINT#1,"M-W";CHR$(I)CHR$(3);
   CHR$(1)CHR$(A)'FQPM
100 NEXT I'BBCU
110 IF S<>15669 THEN PRINT"ERROR IN
    DATA":GOTO 480'GKNF
120 PRINT'BACW
130 PRINT'BACX
140 PRINT TAB(4)"PLEASE INSERT A
    BLANK FORMATTED[SPACE3]"'CCNJ
150 PRINT'BACA
160 PRINT TAB(10)"DISKETTE"'CDRF
180 PRINT'BACD
190 PRINT'BACE
200 PRINT TAB(4)"WHEN READY TO START
    PRESS "CHR$(18)"SPACE"CHR$(146)
    'ELMJ
210 GET A$:IF A$<>CHR$(32)THEN
    210'GMYD
220 PRINT CHR$(19)'CEBA
230 FOR I=0 TO 5:PRINT CHR$(17)
    :NEXT I'GKUE
240 PRINT'BACA
250 PRINT'BACB
260 PRINT'BACC
270 PRINT'BACD
280 PRINT'BACE
290 PRINT"PRESS[SPACE3]
    "CHR$(18)"'F7'"CHR$(146)"WHEN
```

```
SPEED IS O.K."'DJYQ
295 GOSUB 56Ø'BDOL
3ØØ FOR I=Ø TO 2:PRINT CHR$(145);
    :NEXT'GLDC
31Ø PRINT#1,"M-W"CHR$(5)CHR$(3)CHR$(1)
    CHR$(11)'FPKF
32Ø T=36:J=14:GOSUB 57Ø'DLID
33Ø FOR I=1 TO 4'DDHC
34Ø PRINT#1,"M-R"CHR$(6+I)CHR$(3)
    :GET#1,B$'FPRI
35Ø S(I)=ASC(B$+CHR$(Ø))'ELOH
36Ø NEXT I'BBCD
37Ø IF S(3)=Ø OR S(4)=Ø THEN 5ØØ'FNIJ
38Ø C=256*(S(4)+S(3))+S(2)+S(1)
    -3996'GBIO
39Ø C=INT(C/2Ø+Ø.5)'EJMK
4ØØ PRINT CHR$(145)"DISK DRIVE SPEED
    IS[SPACE7]"C"MS[SPACE3]"'CGUH
41Ø GET A$:IF A$=CHR$(136)THEN
    45Ø'FNLE
42Ø IF ABS(C)>5 THEN 31Ø'EHUD
43Ø PRINT#1,"M-W"CHR$(5)CHR$(3)CHR$(1)
    CHR$(78)'FPXI
44Ø GOTO 32Ø'BDED
45Ø PRINT CHR$(17)CHR$(17)CHR$(17)
    'EMZI
46Ø PRINT"O.K."'BAVF
47Ø GOSUB 56Ø'BDOG
48Ø CLOSE 1'BBIG
49Ø END'BACH
5ØØ PRINT'BACY
51Ø PRINT CHR$(18)"ERROR !!!->"'CECE
52Ø PRINT"CHECK[SPACE3]YOUR DISK!!!
    [SPACE9]"'BADH
53Ø FOR I=1 TO 1ØØØ:NEXT I'EIXG
54Ø GOTO 47Ø'BDKE
55Ø REM'BARE
56Ø T=1:J=1'CFHH
57Ø PRINT#1,"M-W"CHR$(6)CHR$(Ø)CHR$(2)
    CHR$(T)CHR$(Ø)'GRRO
58Ø PRINT#1,"M-W"CHR$(Ø)CHR$(Ø)CHR$(1)
    CHR$(J*16)'GQXP
59Ø PRINT#1,"M-R"CHR$(Ø)CHR$(Ø)
    :GET#1,L$:L=ASC(L$+CHR$(Ø))
    :IF L>127 THEN 59Ø'LGMW
6ØØ IF J=12 THEN FOR I=1 TO 25ØØ
    :NEXT'HKAG
61Ø RETURN'BAQB
62Ø REM'BARC
63Ø DATA 169,  Ø,133,  Ø, 76, 11,  3,
     Ø'BVCH
64Ø DATA  Ø,  Ø,  Ø,12Ø,173, 12, 28,
     41'BWQI
65Ø DATA 31,  9,192,141, 12, 28,169,
    255'BBRK
66Ø DATA 141,  3, 28,162, 85,142,  1,
     28'BYIL
67Ø DATA 162, 5Ø,16Ø,  Ø, 8Ø,254,184,
    136'BCGM
68Ø DATA 2Ø8,25Ø,2Ø2,2Ø8,247, 8Ø,254,
    184'BFHO
69Ø DATA 141,  1, 28,169,224, 13, 12,
     28'BAFO
7ØØ DATA 162,  4, 8Ø,254,184,2Ø2,2Ø8,
    25Ø'BDHG
71Ø DATA 141, 12, 28,142,  3, 28,162,
     3'BYAH
72Ø DATA 8Ø,254,184,2Ø2,2Ø8,25Ø,12Ø,
    173'BFXJ
73Ø DATA 11, 24,  9, 64,141, 11, 24,
    162'BYZJ
74Ø DATA  1,169, 98,141,  4, 24,16Ø,
     Ø'BXOJ
75Ø DATA 14Ø,  8,  3,14Ø, 1Ø,  3,14Ø,
     7'BWVK
76Ø DATA  3,14Ø,  9,  3, 44,  Ø, 28,
     48'BUNL
77Ø DATA 251,14Ø,  5, 24, 44,  Ø, 28,
     16'BXGM
78Ø DATA 251, 44,  Ø, 28, 16, 19,173,
     13'BYHO
79Ø DATA 24, 1Ø, 16,245,173,  4, 24,
    254'BAEP
8ØØ DATA  7,  3,2Ø8,237,254,  9,  3,
    2Ø8'BXWG
81Ø DATA 232,2Ø2,24Ø,224,169,191, 45,
     11'BEWJ
82Ø DATA 24,141, 11, 24,169,  1, 88,
    1Ø8'BAJJ
83Ø DATA 232,255'BHAG
```

END

Duck Feathers, Cigars and Bill Cleary

Continued from pg. 73

going problem, with copy protection. So it depends upon the type of software you are talking about. If someone wants a word processor, and they want to do something with their particular system, we are looking at options to allow them to do that. If the users in mass are telling us to remove copy protection, inevitably that's probably the most logical course to pursue.

Fields: Is there a solution to software piracy?

Cleary: Not a 100% solution—just like piracy of any kind. Like people who copy tapes, you can't eliminate it entirely. You just deal with it. It's part of the cost of doing business. It's a real problem.

Fields: How many copies of a product do you have to sell to turn a profit? And do most packages sell that well?

Cleary: The break even point depends upon the product. Some products are profitable at 30,000 and others don't turn the corner until we sell 400,000. Sales depend upon the quality of the product, the idea and the strength of the idea, and the amount of marketing support put behind it. Some sell very, very well and others do not. This is not a business to enter if you want to become an overnight success. You might have the best idea in the world, but the marketplace may reject it.

Fields: Which sells better—productivity or entertainment software?

Cleary: Entertainment. Entertainment is 50 to 55% of our sales.

This is not a business to enter if you want to become an overnight success. You might have the best idea in the world, but the marketplace may reject it.

Fields: Which computer systems will you be supporting heavily next year—Commodore 64, 128 or Amiga?

Cleary: All of them.

Fields: Do you employ in-house programmers?

Cleary: Yes, some. David Crane (*Pitfall, Ghostbusters, Transformers*) was one of the founders of the company, along with Steve Cartwright, Russel Lieblich, Glyn Anderson and Gene Smith, who have written some blockbuster software hits.

Fields: You are importing English and French software. Why?

Cleary: That's true. We have always looked for the best software from around the world.

Fields: Many of today's young Commodore 64 owners dream of making a fortune programming. Is that a viable dream?

Cleary: Absolutely yes. For bright, innovative, creative people there will always be an opportunity to make a small fortune in programming. Just like song writers and novelists, there's always that opportunity. The one thing they will have to do is continue to learn and grow and study the industry to find out what sells and why. I think the *GameMaker* contest was interesting in that I saw that there were many individuals out there with real game talent and ability.

Fields: How would someone break into the big-time software market?

Cleary: Basically you would sit down and define your ideas on a very small piece of paper. Remember, this is entertainment—keep your ideas simple. Then correspond with some of the major publishers, just like an author would. Try to get in that way. If I got a disk and a letter from some user out there which said "I have the most incredible idea. Get your 64 and boot it up and let me know what you think," I would be predisposed as a publisher to look at that product. I think most of the leading software publishers would feel the same.

Fields: Is there a great American software program still unwritten out there somewhere?

Cleary: There are thousands of them. There are lots of ideas that haven't been developed. Computer users are full of ideas.

Fields: Tell us what we can expect from Activision next year.

Cleary: We are currently engaged in designing a product with Timothy Leary. And we will continue to introduce products under the Gamestar and entertainment line. You can be sure whatever you see will be exciting, creative and interesting products. Bigger and better—not necessarily more.

In the next few years we will go about building on what we have already acquired and the inroads we have already made. I think we'll learn more about the markets, learn more about what people want. Our vision is to publish the best, most entertaining, fun products in the world. Success is determined by how well we know our customers. If we understand our customer, the rest is fairly simple.

I'm very optimistic about Activision and all the companies that have taken the home computer market seriously. The demand for good software will continue. As long as people buy computers, we'll be selling software.

If Activision's promotions are a little wacky, it's just because they know business can be serious and fun at the same time. But most importantly, I know it's safe to open my mail. ■

GFL CHAMPIONSHIP FOOTBALL

Continued from pg. 38

points, timeouts, downs and yards to go, and also displays a pair of timers showing the minutes left in the game as well as the time remaining on the 30-second clock. The play choices on both sides of the line, with names like blast, trap and slant, or nickle, inside blitz and corner roll, are actual pro football formations played out before you. And kickoffs, punts and extra points are all included, not as mere passive routines, but as real timing exercises that will require concentration and practice to be executed successfully.

After a season's worth of games under my belt, the only omission I've found is the absence of the two-minute warning that is usually given before the close of both halves.

Now if you're one of football's amateur armchair athletes who thinks he might be a little overwhelmed by all that this program packs, I turn your attention to the official GFL Player's Guide. In the 42 pages that comprise this manual, you will find everything you need to know about the principles, theories or strategies governing this or any other football simulator. It covers every facet of coaching and executing all aspects of play, with a host of charts, graphs and illustrations included to help assure strides toward perfection.

And your assistance is not only limited to off-field instructions. While each offensive play is being run, a pair of arrows appear at the bottom border of the screen to help direct you as to which way your surrogate should be running. Also, after a play has concluded, there is an optional feedback feature that will freeze the clock and highlight the offensive and defensive plays that were just run. By noting the results of the clash, this feature allows users to study how the two plays matched, helping to improve one's play-calling ability.

Not only does this program inject some novel elements into a field of relative clones, but it does so without disrupting any of the sacred underlying principles of a fairly complex sport. The unfamiliarity of the perspective might leave some empty stadium seats during its first season, but that's to be expected. Gamestar proves that innovation in design is not yet a thing of the past. C

Extra Points
Advice on Reaching Your Goal

Before you break from the huddle, you should be sure to look over the tips Gamestar supplies in the "Playing Better Football" chapter of their Player's Guide. They're guaranteed to improve your game. Also, I've tagged on a few extra hints below that might help you to gain an added yard or two. Ready? Break!

The slant of your game plan is a matter of personal taste. Some like to emphasis a deliberate running game, while others concentrate on the more dramatic aerial attack. Each has its advantages. But no matter what approach you desire, take the time to study all the stats of your possible selections in the draft. Make sure the strength of the squad you choose can support your particular assault. Also, don't forget to pay attention to the ratings chart of your opponent's team. Once you know your competitor's weaknesses, you can then steer your game plan to take advantage of them.

There is a chart in the GFL Player's Guide that actually breaks each pass pattern down to the exact number of steps that should be taken in each direction. This aid is the secret to success. You will be able to hear your receiver's footsteps as he moves through his route. Count the steps and make your cuts accordingly. If you try to run your pattern by watching the arrows at screen's bottom, you will slow down your player and miss the pass.

Most coaches have a pet play or two that they automatically turn to on pressure downs. Knowing your opponent's tendencies will help you to shut down his offense during these critical times. Whenever your defense is up against a third and short, check the feedback feature after the play and study your opponent's selection. Chances are that the same play will be used when a similar situation arises later in the game. This tip is especially effective when you're up against the more predictable computer.

This last bit of advice is pretty common knowledge to most football fans, but even the big league coaches seem to forget it occasionally, so it bears repeating. When you're holding a lead in the latter stages of a game, it's usually to your advantage to take as much time off the clock as possible. Remember, you will chew up more time on the ground than in the air, so run the ball whenever you can. Also, waste as much time as possible choosing your play in the huddle. You're given 30 seconds to snap the ball, so use 30 seconds. C

Big Name Hunting in America *Continued from pg. 80*

my new untitled creation could be adapted to fit the *Ghostbusters* storyline, so I agreed to do the project. Unfortunately, another complication was added to the scheme of things: I was getting married in August and my wife wouldn't let me go on the honeymoon until the game was completed.

In the following weeks, I found myself attending several showings of *Ghostbusters*. Looking back, I wonder what the people in the theater thought I was doing—here I was seriously studying the movie, taking notes and drawing diagrams. Later in the project, Columbia (under strictest security) provided me a video tape of the film. They also sent a copy of the shooting script and hundreds of slides and stills from the movie.

Jermaine: Why did you purchase the rights to *Howard the Duck*?

Lehrberg: Early in 1986 we read the script for the *Howard the Duck* movie and fell in love with the character. After all, Howard the Duck was the subject of a major film and had been in comic books since the 1970's. The game itself picks up where the movie left off. Our game designers examined the situation and felt that they could do more with the character if we made our program a sequel to the movie. Universal Studios was concerned about how Howard would look on the screen, so we worked closely with them to make him look his best. In the end, everything went pretty smoothly.

Jermaine: I mentioned the Transformers™ license in part one of this feature. Can you tell us about this?

Lehrberg: The Transformers appealed to us because they were the subject of toys, cartoon shows and a movie. David Crane was also experimenting with a new animation technology at the time which allowed him to change the appearance of large shapes very quickly. The Transformers fit the bill perfectly as a vehicle for David's new technique. Hasbro was also making sure that we accurately portrayed the characteristics, personalities and graphics of each Transformer character. A final thought that convinced us to buy the license was that the Transformers game would provide entertainment for our younger followers. Sometimes software companies tend to neglect them.

Jermaine: Can you give me some information about *Aliens*?

Lehrberg: We became interested in *Aliens*, like *Ghostbusters*, after we read the film script in late 1985. Our people were concerned with the graphic violence of the movie, but we still believed we could take the basic elements of the story and turn them into a presentable product that would appeal to our largest computer audience—early teen males.

> *"Personally, I view a license when it's used in conjunction with software to be a marketing ploy. I want a program to be able to stand on its own merit."*

Aliens was so popular with the Activision designers that totally separate programs, using the same title, were developed in the United States and England. I know of no other case in which two different games were developed concurrently by the same company in different countries based upon the same property.

Jermaine: Consider for a moment your licensed ventures versus your original programs. Is software containing licensed characters more successful than original material?

Lehrberg: I don't believe licensed software is more or less successful than products containing original themes. It all depends on how good the program itself is. The license helps, but it also makes a project more expensive, and a good license won't help a bad product.

Jermaine: Would you like to make a final comment about the use of licensed characters of themes in your software?

Lehrberg: Licensed products tend to sell well around the world, but each individual property can have a different level of appeal in one country as opposed to another. David Bowie, for example, is extremely popular in Europe, so *Labyrinth* had a little extra going for it there.

Lucasfilm Team Effort on *Labyrinth*

Speaking of *Labyrinth*, I interviewed several individuals at Lucasfilm Games, the developers of *Labyrinth*, about how they feel about licensing. I spoke with Stephen Arnold, director of Lucasfilm games division, and David Fox and Charlie Kellner, designers/programmers.

Jermaine: Tell me about your licensing activities.

Arnold: When the *Labyrinth* film project was being discussed, we were asked if we would like to design a game based on the story of the movie. We agreed to do one. Since the film was developed as a joint venture between Lucasfilm and Henson Associates and programmed by Lucasfilm Games, we were the licensors of the film properties. Activision purchased the license to market and distribute the product. The game itself was designed by a team consisting of Lucasfilm Game Division, Activision and Henson Associates. Neither George Lucas, Jim Henson nor David Bowie were directly involved in the creation of the program.

Until recently, the rights to make video game software based on the *Star Wars* film were licensed to Parker Brothers. A few years ago, they marketed cartridge games for VCS units (like the Atari 2600 system) and created some microcomputer programs, including one for the Commodore 64. Atari's coin-op division also developed some *Star Wars* related arcade machines. The marketing/licensing branch of Lucasfilm sold limited software rights to use the Indiana Jones character in some educational programs being produced by Mindscape. Lucasfilm did not contribute anything to the Mindscape software directly.

Lucasfilm has not considered directly purchasing the rights to any outside film character or idea for game development. From time to time we are approached by various software publishers and film companies asking whether we would be interested in designing a game based on a popular movie or character. If the right project came along, however, we might get involved.

Jermaine: Could you give me some background information on *Labyrinth*?

Fox: We started working on *Labyrinth* in November of 1985 and completed the program by August of 1986. It contains four megabytes of source code and about 260K of object code. Stephen Arnold, Charlie Kellner and I represented Lucasfilm Games. Brenda Laurel, the director of Learning and Creativity Products at Activision, added her special talents to the creation of the program.

We also brought Chris Cerf and Douglas Adams into the group. Both of these people are very creative and also are familiar with Jim Henson's work. Since the *Labyrinth* film script was based on a

story by Jim Henson and Dennis Lee, Chris would keep the Henson attitude present throughout the planning of the project. Chris works closely with the Henson people on certain projects while developing others under his own banner, Christopher Cerf Associates.

Douglas is a talented English writer, famous for the four-book series *The Hitchhiker's Guide to the Galaxy*. It has already been translated to radio, television and a computer game. None of us had ever worked with Douglas, but all of us were aware of who he was, and some of the group had either seen or met him at various science fiction conventions here in the United States.

Jermaine: How did you plan the program?

Kellner: Douglas lives in London, so we gathered the flock and flew to England in January of 1985. Our meetings took place at Jim Henson's London office and at Adams' home, with most of them lasting 8 to 12 hours a day. We completed our work in a week, so we returned home to program the game. While the trip to London was most helpful in generating many ideas for the program, when we returned we still had to consolidate all of them into a cohesive design and complete the immense programming task. Brenda Laurel and Chris Cerf were involved in this process and continued to contribute and refine the program as we implemented it at Lucasfilm Games. As for Douglas Adams, we all enjoyed his zany influence on the project, and he seemed to have a lot of fun contributing to the game design.

Jermaine: What exactly did Douglas contribute to the project?

Kellner: Everyone came up with interesting ideas during the London meetings, but Douglas has a special way of looking at things. For example, at the beginning of the game, the adventure is a tongue-in-cheek parody of all the bad text adventures we've seen on the market.

The adventure is also displayed in blue and white text until the player enters the labyrinth, where the game becomes fully animated full-color adventure. By doing things this way, we duplicated the feelings people experienced while watching *The Wizard of Oz*. When Dorothy entered the realm of Oz, the film changed from black and white into color.

Douglas also came up with the idea for the elephant movie poster. I don't want to tell you too much about it, except that you should view it several different times before you leave the adventure.

"We don't understand why a company would buy a strong, expensive title like The A-Team *and then just sit on it."*

Jermaine: Did Jim Henson provide much support material for the project?

Fox: Since both the film and the game project were part of the joint Lucasfilm-Henson venture, we had free access to practically any material we needed. This included reference slides of sets and creatures, access to the music, and viewing of some scenes to get a sense of the story. We also had access to the movie script and the novelization. Later in the development of the program, we were even allowed to view a pre-release version of the film.

Jermaine: When you started writing the *Labyrinth* program, why didn't you incorporate fractal technology into it?

Fox: *Labyrinth* is not a point-of-view game. We wanted to have artist-rendered scenes to capture the true feeling of the labyrinth environment. Fractals are used to create a randomly generated background.

Jermaine: Did you ever think of making the *Labyrinth* game a sequel to the movie?

Fox: No, but it doesn't duplicate the events of the film either. *Labyrinth* is the player's adventures in Jareth's labyrinth, not Sara's. (Sara is the person who travels through the labyrinth in the film.) Therefore, the game play and solutions are not exactly what you see in the movie, though some of the situations and environments are familiar.

We wanted the program to be fun and capture the feeling of the film, while being different each time you play it. To keep things interesting, the program monitors your behavior with the various characters. From this information, the program determines which pattern to use in the game, and there are many different patterns of play. How does it work? Now that would be telling!

Jermaine: You mentioned that there are four megabytes of source code and 260K of object data in the program. How was that possible?

Kellner: We had to develop several new techniques to make *Labyrinth* a reality, but the most interesting part was probably the least visible—the method by which we were able to squeeze a tremendous amount of graphics and game play onto two sides of a single disk. The characters walking around in the labyrinth and the scenes they walk around in only take up about a tenth of the memory they would have needed in previous games. And amazingly enough, the same techniques that shrink the size of the data were also able to shrink the characters themselves. Everything is accomplished in real time, so they can turn and walk into the distance, growing smaller as they get further away.

Jermaine: What component of the game gave you the most trouble?

Kellner: The wall of hands was very difficult to simulate in computer graphic form. In the movie, Sara falls through a trap door and is caught by a wall of animated hands. The whole wall seems to be alive. Everything moves. This scene is not easy to duplicate on a home computer screen. To do it properly, we had to make the hands part of the background scene, then animate the whole background for every frame of graphics. This required us to develop routines for re-drawing the background that were fast and nearly as flexible as the foreground character animation. It was a lot of work, but it gave us a great deal more freedom in what we could attempt, because now we could consider changing anything and everything in the background at a moment's notice. Lucasfilm Games, like Jim Henson's vision of his labyrinth, is a place where anything can happen.

I think it's interesting that *Labyrinth* contains about 20 different games and each one could have been the basis for a stand-alone game several years ago.

So now you know how some of your favorite characters end up in software. And at this very moment, someone somewhere may be signing *Moonlighting* or *Doonesbury* to star in their piece of software. Stay tuned.

HOW TO ENTER PROGRAMS

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN,RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice. Note: Do not enter the commas.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHIFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

Syntax Error

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270," type LIST 270 and press RETURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parentheses. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the wrong line to look at. If the line the syntax error refers to has a function call (e.g., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

Illegal Quantity Error

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

Out Of Data Error

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

Other Problems

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long and the 128 a line up to 160 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than the standard number of characters on one line.

"[HOME]" = UNSHIFTED CLR/ HOME
"[CLEAR]" = SHIFTED CLR/HOME
"[DOWN]" = CURSOR DOWN
"[UP]" = CURSOR UP
"[RIGHT]" = CURSOR RIGHT
"[LEFT]" = CURSOR LEFT
"[RVS]" = CONTROL 9
"[RVOFF]" = CONTROL 0
"[BLACK]" = CONTROL 1
"[WHITE]" = CONTROL 2
"[RED]" = CONTROL 3
"[CYAN]" = CONTROL 4
"[PURPLE]" = CONTROL 5
"[GREEN]" = CONTROL 6
"[BLUE]" = CONTROL 7
"[YELLOW]" = CONTROL 8
"[ORANGE]" = COMMODORE 1
"[BROWN]" = COMMODORE 2
"[L. RED]" = COMMODORE 3
"[GRAY1]" = COMMODORE 4
"[GRAY2]" = COMMODORE 5
"[L. GREEN]" = COMMODORE 6
"[L. BLUE]" = COMMODORE 7
"[GRAY3]" = COMMODORE 8
"[F1]" = F1
"[F2]" = F2
"[F3]" = F3
"[F4]" = F4
"[F5]" = F5
"[F6]" = F6
"[F7]" = F7
"[F8]" = F8
"[POUND]" = ENGLISH POUND
"[SHFT ^]" = PI SYMBOL
"[^]" = UP ARROW

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,COMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

HOW TO ENTER PROGRAMS

You can enter these lines by abbreviating the commands when you enter the line. The abbreviations for BASIC commands are in your user guide.

If you type a line that is longer than the acceptable number of characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed (without a line number). Many people write that the computer gives them a syntax error when they type the line, or that the computer refuses to accept a line. Both of these problems are results of typing a line that has too many characters.

The Program Won't Run!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is "running." Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

If All Else Fails

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program. The user group may also have the program on a library disk and be willing to make a copy for you. For $9.95 per issue, you can also get all the BASIC programs in each issue, as well, from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase your understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

The name of the program
The issue of the magazine it was in
The computer you are using
Any error messages and the line numbers
Anything displayed on the screen
A printout of your listing (if possible)

All of this information is helpful in answering your questions about why a program doesn't work. A letter that simply states "I get an error in line 250 whenever I run the program" doesn't give us much to go on. Send your questions to:

Commodore Magazines
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

The Magazine Entry Programs on the next pages are two BASIC machine language programs that will assist you in entering the programs in this magazine correctly. There are versions for both the Commodore 64 and the Commodore 128. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 49900 (4864-5545 on the 128) and just lets you know that the program is running. If everything is ok, the program will finish running and say DONE. Then type NEW. If there is a problem with the data statements, the program will tell you where to find the problem. Otherwise the program will say "mistake in data statements." Check to see if commas are missing, or if you have used periods instead of commas. Also check the individual data items.

Once the program has run, it is in memory ready to go. To activate the program type SYS49152 (SYS4864 on the 128), and press RETURN. You are now ready to enter the programs from the magazine. To disable the Entry Program, just type KILL (RETURN) on the 64 or SYS4867 on the 128.

The checksums for each line are the same for both the 64 and 128, so you can enter your 64 programs on the 128 if you'd like.

Typing the Programs

All the BASIC program listings in this magazine that are for the 64 or 128 have an apostrophe followed by four letters at the end of the line (e.g., 'ACDF). If you plan to use the Magazine Entry Program to enter your programs, the apostrophe and letters **should** be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it **does not** enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are five error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

Continued next page

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT. .) incorrectly. Check the line in the magazine again and check your spelling.

OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake.

MAGAZINE ENTRY PROGRAM—64

The Magazine Entry Programs are available on disk, along with the other programs in this magazine, for $9.95. To order, contact Loadstar at 1-800-831-2694.

```
10 PRINT"[CLEAR]POKING -";
20 P=49152 :REM $C000  (END AT
   49900/$C2EC)
30 READ A$:IF A$="END"THEN 110
40 L=ASC(MID$(A$,2,1))
50 H=ASC(MID$(A$,1,1))
60 L=L-48:IF L>9 THEN L=L-7
70 H=H-48:IF H>9 THEN H=H-7
80 PRINT"[HOME,RIGHT12]"P;
90 IF H>15 OR L>15 THEN PRINT
   :PRINT"DATA ERROR IN LINE";
   1000+INT((P-49152)/8):STOP
100 B=H*16+L:POKE P,B:T=T+B:P=P+1
    :GOTO 30
110 IF T<>86200 THEN PRINT
    :PRINT"MISTAKE IN DATA --> CHECK
    DATA STATEMENTS":END
120 PRINT"DONE":END
1000 DATA 4C,1F,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,0D,00,21
1002 DATA C1,27,C1,2F,C1,3F,C1,4C
1003 DATA C1,EA,EA,EA,4C,54,C0,A2
1004 DATA 05,BD,19,C0,95,73,CA,10
1005 DATA F8,60,60,A0,03,B9,00,02
1006 DATA D9,04,C1,D0,F5,88,10,F5
1007 DATA A0,05,B9,A2,E3,99,73,00
1008 DATA 88,10,F7,A9,00,8D,18,D4
1009 DATA 4C,EF,C0,E6,7A,D0,02,E6
1010 DATA 7B,4C,79,00,A5,9D,F0,F3
1011 DATA A5,7A,C9,FF,D0,ED,A5,7B
1012 DATA C9,01,D0,E7,20,2B,C0,AD
1013 DATA 00,02,20,74,C0,90,DC,A0
1014 DATA 00,4C,A9,C1,C9,30,30,06
1015 DATA C9,3A,10,02,38,60,18,60
1016 DATA C8,B1,7A,C9,20,D0,03,C8
1017 DATA D0,F7,B1,7A,60,18,C8,B1
1018 DATA 7A,F0,37,C9,22,F0,F5,6D
1019 DATA 03,C0,8D,03,C0,AD,04,C0
1020 DATA 69,00,8D,04,C0,4C,8E,C0
1021 DATA 18,6D,05,C0,8D,05,C0,90
1022 DATA 03,EE,06,C0,EE,09,C0,4C
1023 DATA CE,C1,18,6D,08,C0,8D,08
1024 DATA C0,90,03,EE,07,C0,EE,0A
1025 DATA C0,60,0A,A8,B9,0F,C0,85
1026 DATA FB,B9,10,C0,85,FC,A0,00
1027 DATA A9,12,20,D2,FF,B1,FB,F0
1028 DATA 06,20,D2,FF,C8,D0,F6,20
1029 DATA BC,C2,20,E4,FF,F0,FB,A0
1030 DATA 18,B9,08,C1,20,D2,FF,88
1031 DATA 10,F7,68,68,A9,00,8D,00
1032 DATA 02,4C,74,A4,4B,49,4C,4C
1033 DATA 91,91,0D,20,20,20,20,20
1034 DATA 20,20,20,20,20,20,20,20
1035 DATA 20,20,20,20,20,20,20,91
1036 DATA 0D,51,55,4F,54,45,00,4B
1037 DATA 45,59,57,4F,52,44,00,23
1038 DATA 20,4F,46,20,43,48,41,52
1039 DATA 41,43,54,45,52,53,00,55
1040 DATA 4E,49,44,45,4E,54,49,46
1041 DATA 49,45,44,00,4E,4F,20,43
1042 DATA 48,45,43,4B,53,55,4D,00
1043 DATA C8,B1,7A,D0,FB,84,FD,C0
1044 DATA 09,10,03,4C,84,C1,88,88
1045 DATA 88,88,88,B1,7A,C9,27,D0
1046 DATA 13,A9,00,91,7A,C8,A2,00
1047 DATA B1,7A,9D,3C,03,C8,E8,E0
1048 DATA 04,D0,F5,60,A9,04,4C,CA
1049 DATA C0,A0,00,B9,00,02,99,40
1050 DATA 03,F0,F0,C8,D0,F5,A0,00
1051 DATA B9,40,03,F0,E6,99,00,02
1052 DATA C8,D0,F5,20,96,C1,4C,12
1053 DATA C2,A0,09,A9,00,99,03,C0
1054 DATA 8D,3C,03,88,10,F7,A9,80
1055 DATA 85,02,A0,00,20,58,C1,20
1056 DATA 89,C1,20,ED,C1,E6,7A,E6
1057 DATA 7B,20,7C,A5,A0,00,20,80
1058 DATA C0,F0,D0,24,02,F0,06,4C
1059 DATA A8,C0,4C,CE,C1,C9,22,D0
1060 DATA 06,20,8D,C0,4C,CE,C1,20
1061 DATA BA,C0,4C,CE,C1,A0,00,B9
1062 DATA 00,02,20,74,C0,C8,90,0A
1063 DATA 18,6D,07,C0,8D,07,C0,4C
1064 DATA EF,C1,88,A2,00,B9,00,02
1065 DATA 9D,00,02,F0,04,E8,C8,D0
1066 DATA F4,60,18,AD,09,C0,69,41
1067 DATA 8D,09,C0,38,AD,0A,C0,E9
1068 DATA 19,90,06,8D,0A,C0,4C,1C
1069 DATA C2,AD,0A,C0,69,41,8D,0A
```

```
1070 DATA C0,AD,03,C0,6D,05,C0,48
1071 DATA AD,04,C0,6D,06,C0,8D,0C
1072 DATA C0,68,6D,08,C0,8D,0B,C0
1073 DATA AD,0C,C0,6D,07,C0,8D,0C
1074 DATA C0,38,E9,19,90,06,8D,0C
1075 DATA C0,4C,52,C2,AD,0C,C0,69
1076 DATA 41,8D,0C,C0,AD,0B,C0,E9
1077 DATA 19,90,06,8D,0B,C0,4C,67
1078 DATA C2,AD,0B,C0,69,41,8D,0B
1079 DATA C0,A0,01,AD,09,C0,CD,3C
1080 DATA 03,D0,20,C8,AD,0A,C0,CD
1081 DATA 3D,03,D0,17,C8,AD,0B,C0
1082 DATA CD,3E,03,D0,0E,AD,0C,C0
1083 DATA CD,3F,03,D0,06,20,CC,C2
1084 DATA 4C,4B,C0,98,48,68,4C,CA
1085 DATA C0,A9,20,8D,00,D4,8D,01
1086 DATA D4,A9,09,8D,05,D4,A9,0F
1087 DATA 8D,18,D4,60,20,A9,C2,A9
1088 DATA 81,20,DF,C2,A9,80,20,DF
1089 DATA C2,4C,D9,C2,20,A9,C2,A9
1090 DATA 11,20,DF,C2,A9,10,20,DF
1091 DATA C2,A9,00,8D,04,D4,60,8D
1092 DATA 04,D4,A2,70,A0,00,88,D0
1093 DATA FD,CA,D0,FA,60,END
```

END

MAGAZINE ENTRY PROGRAM—128

```
5 TRAP 200
10 PRINT"[CLEAR]POKING -";
20 P=4864 :REM $1300  (END AT
   5545/$15A9)
30 READ A$:IF A$="END"THEN 110
80 PRINT"[HOME,RIGHT12]"P;
100 B=DEC(A$):POKE P,B:T=T+B:P=P+1
    :GOTO 30
110 IF T<>59311 THEN PRINT
    :PRINT"MISTAKE IN DATA --> CHECK
    DATA STATEMENTS":END
120 PRINT"DONE":END
200 PRINT:PRINT"DATA ERROR IN LINE";
    1000+INT((P-4864)/8):END
1000 DATA 4C,1E,13,4C,3A,13,00,00
1001 DATA 8E,00,F7,00,42,41,51,57
1002 DATA 0D,00,0D,43,08,14,0E,14
1003 DATA 16,14,26,14,33,14,A9,00
1004 DATA 8D,00,FF,AD,04,03,8D,12
1005 DATA 13,AD,05,03,8D,13,13,A2
1006 DATA 4A,A0,13,8E,04,03,8C,05
1007 DATA 03,60,AD,12,13,8D,04,03
1008 DATA AD,13,13,8D,05,03,60,6C
1009 DATA 12,13,A5,7F,D0,F9,AD,00
1010 DATA 02,20,5B,13,90,F1,A0,00
1011 DATA 4C,6F,14,C9,30,30,06,C9
1012 DATA 3A,10,02,38,60,18,60,C8
1013 DATA B1,3D,C9,20,D0,03,C8,D0
1014 DATA F7,B1,3D,60,18,C8,B1,3D
1015 DATA F0,35,C9,22,F0,F5,6D,06
1016 DATA 13,8D,06,13,AD,07,13,69
1017 DATA 00,8D,07,13,4C,75,13,18
1018 DATA 6D,08,13,8D,08,13,90,03
1019 DATA EE,09,13,EE,0C,13,60,18
1020 DATA 6D,0B,13,8D,0B,13,90,03
1021 DATA EE,0A,13,EE,0D,13,60,0A
1022 DATA A8,B9,14,13,85,FB,B9,15
1023 DATA 13,85,FC,A0,00,8C,00,FF
1024 DATA A9,12,20,D2,FF,B1,FB,F0
1025 DATA 06,20,D2,FF,C8,D0,F6,20
1026 DATA 79,15,20,A3,15,20,E4,FF
1027 DATA F0,FB,A0,1B,B9,EF,13,20
1028 DATA D2,FF,88,10,F7,68,68,A9
1029 DATA 00,8D,00,02,4C,B7,4D,91
1030 DATA 91,0D,20,20,20,20,20,20
1031 DATA 20,20,20,20,20,20,20,20
1032 DATA 20,20,20,20,20,20,91,0D
1033 DATA 51,55,4F,54,45,00,4B,45
1034 DATA 59,57,4F,52,44,00,23,20
1035 DATA 4F,46,20,43,48,41,52,41
1036 DATA 43,54,45,52,53,00,55,4E
1037 DATA 49,44,45,4E,54,49,46,49
1038 DATA 45,44,00,4E,4F,20,43,48
1039 DATA 45,43,4B,53,55,4D,00,C8
1040 DATA B1,3D,D0,FB,C0,06,10,03
1041 DATA 4C,69,14,88,88,88,88,88
1042 DATA B1,3D,C9,27,D0,13,A9,00
1043 DATA 91,3D,C8,A2,00,B1,3D,9D
1044 DATA 00,0B,C8,E8,E0,04,D0,F5
1045 DATA 60,4C,5C,15,4C,C5,14,A0
1046 DATA 09,A9,00,99,06,13,8D,00
1047 DATA 0B,88,10,F7,A9,80,85,FD
1048 DATA A0,00,20,3F,14,20,AE,14
1049 DATA 20,0D,43,84,FA,A0,FF,20
1050 DATA 67,13,F0,D8,24,FD,F0,06
1051 DATA 20,8F,13,4C,8F,14,C9,22
1052 DATA D0,06,20,74,13,4C,8F,14
1053 DATA 20,9F,13,4C,8F,14,A0,00
1054 DATA B9,00,02,20,5B,13,C8,90
1055 DATA 0A,18,6D,0A,13,8D,0A,13
1056 DATA 4C,B0,14,88,60,18,AD,0C
1057 DATA 13,69,41,8D,0C,13,38,AD
1058 DATA 0D,13,E9,19,90,06,8D,0D
1059 DATA 13,4C,CF,14,AD,0D,13,69
1060 DATA 41,8D,0D,13,AD,06,13,6D
1061 DATA 08,13,48,AD,07,13,6D,09
1062 DATA 13,8D,0F,13,68,6D,0B,13
1063 DATA 8D,0E,13,AD,0F,13,6D,0A
1064 DATA 13,8D,0F,13,38,E9,19,90
1065 DATA 06,8D,0F,13,4C,05,15,AD
1066 DATA 0F,13,69,41,8D,0F,13,AD
1067 DATA 0E,13,E9,19,90,06,8D,0E
1068 DATA 13,4C,1A,15,AD,0E,13,69
1069 DATA 41,8D,0E,13,A0,01,AD,0C
1070 DATA 13,CD,00,0B,D0,20,C8,AD
1071 DATA 0D,13,CD,01,0B,D0,17,C8
1072 DATA AD,0E,13,CD,02,0B,D0,0E
1073 DATA AD,0F,13,CD,03,0B,D0,06
1074 DATA 20,89,15,A4,FA,60,98,48
1075 DATA 68,4C,AF,13,A9,04,4C,AF
1076 DATA 13,A9,00,8D,00,FF,A9,20
1077 DATA 8D,00,D4,8D,01,D4,A9,09
1078 DATA 8D,05,D4,A9,0F,8D,18,D4
1079 DATA 60,20,61,15,A9,81,20,9C
1080 DATA 15,A9,80,20,9C,15,4C,96
1081 DATA 15,20,61,15,A9,11,20,9C
1082 DATA 15,A9,10,20,9C,15,A9,00
1083 DATA 8D,04,D4,60,8D,04,D4,A2
1084 DATA 70,A0,00,88,D0,FD,CA,D0
1085 DATA FA,60,END
```

END

USER GROUPS

Although there are almost 1000 known Commodore user groups nationwide and around the world, this list includes only those that have been officially recognized by Commodore as Approved User Groups. If your group would like to apply for Approved status, contact Pete Baczor, User Group Coordinator, at Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

Commodore user groups provide invaluable assistance to Commodore computerists. If you are looking for people who share your computing interests, or if you need help getting started with your computer, contact the group near you.

ALABAMA

Bay Minette
B-128 Commodore Users' Group (South)
P.O. Box 164, AL 36507
PET VIC 64

Birmingham
Birmingham Commodore Club
P.O. Box 59564, AL 35222

Birmingham
Commodore Club - South
P.O. Box 324, AL 35126
64 128 Amiga

Decatur Valley Commodore Users' Group
P.O. Box 835, AL 35602
VIC 64 128 Amiga

Evergreen
The Byte Bunch
318 Perryman St., AL 36401
PET VIC 64 128 Amiga PC

Florence
Shoals Commodore Users' Group
114 Van Fleet Dr., AL 35630

Gadsden
Coosa Valley Commodore Club
2800 Waters Ave., AL 35904
64 128 Amiga

Huntsville
Computeen Computer Club
10118 Shades Rd., AL 35803

Mobile
Commodore Club of Mobile
3868-H Rue Maison Road,
AL 36608

Montgomery
M.A.C.K.S.
P.O. Box 210126, AL 36121-0126
PET VIC 64 128 Amiga PC

Scottsboro
Scottsboro Commodore Users' Group
Route #5, Box 255, AL 35768
64 128 Amiga PC

Smith's
Smith's Alabama Commodore Users' Group
Route 2, Box 105, AL 36877
VIC 64 128 Amiga

Tuscaloosa
Tuscaloosa Users' Society Kommodore
P.O. Box 439, AL 35402
PET VIC 64 128 Amiga PC

ALASKA

Anchorage
Anchorage Commodore Users' Group
P.O. Box 104615, AK 99510
VIC 64 128 Amiga

Amiga Users' Group of Alaska
12936 Jeanne Rd., AK 99516
Amiga

Juneau
Juneau Commodre Users' Group
9357 Northland, AK 99801
64 128 Amiga PC

Sitka
Sitkas Commodore Users' Group
P.O. Box 2204, AK 99835

ARIZONA

Chino Valley
Prescott Area Commodore Club
1631 N. Canfield Ave., AZ 86323

Globe
Gila Hackers
Route #1, Box 34, AZ 85501
64 128

Sierra Vista
Thunder Mountain Commodore Computer Users' Group
P.O. Box 1796, AZ 85636
VIC 64 128 Amiga PC

Tempe
Arizona Commodore Users' Group
P.O. Box 27201, AZ 85282

Tucson
Catalina Commodore Computer Club
2634 E. Malvern St., AZ 85716
VIC 64 128 Amiga PC

ARKANSAS

Fort Smith
Commodore Computer Club of Ft. Smith
P.O. Box 6000, South Station,
AR 72906

North Little Rock
River City Commodore Computer Club
P.O. Box 4298, AR 72116
64 128 Amiga PC

Pine Bluff
Commodore Computer Club of Pine Bluff
P.O. Box 1083, AR 71613
64 128 Amiga

CALIFORNIA

Alta Loma
CACTUS
P.O. Box 1277, CA 91701
PET VIC 64 128

Anaheim
20/64 Group
2170 W. Broadway, Suite 529,
CA 92804-2446

Antioch
The Commoodre Connection Users' Group
3210 Tabora Dr., CA 94509
VIC 64 128

Arcadia
Pasadena Commodore Computer Club
P.O. Box 1163, CA 91006
PET VIC 64 128 Amiga PC

Auburn
Auburn Commodore Computer Club
P.O. Box 4270, CA 95604
PET VIC 64 128 Amiga PC

Bakersfield
ABACUS
P.O. Box 3415, CA 93385
PET VIC 64 128 Amiga PC

Concord
Diablo Valley Commodore Users' Group
P.O. Box 27155, CA 94598
64 128 Amiga

Denair
Valley Computer Club
P.O. Box 310, CA 95316
PET VIC 64 128

Hollywood
Hollywood Users' Group
P.O. Box 38313, CA 90038
64 128 Amiga PC

Huntington Beach
West Orange County Commodore Users' Group
20311 Ravenwood Lane, CA 92647
64 128

Laguna Hills
South Orange Commodore Klub
25401 Champlain Rd., CA 92653

Long Beach
Commodore Helpers
3736 Myrtle Ave., CA 90807

Los Angeles
Los Angeles Amiga Users' Group
1711 Altivo Way, CA 90026

Monterey
Plus/4 Users' Group
P.O. Box 1001, CA 93942

Napa
Napa Valley Commodore Computer Club
P.O. Box 2324, CA 94558
VIC 64 128

Oceanside
Oceana-64
1004 Plover Way, CA 92056
64 128

Paso Robles
Simply Users' of Computers
301 Veronica Dr., CA 93446
PET VIC 64 128 Amiga PC

Point Magu
Point Magu Users' Association
P.O. Box 42360, CA 93042-0360

Redding
C.O.U.G.A.R.
2776 Helen St., Apt. A, CA 96002
PET VIC 64 128 Amiga PC

Riverside
Moreno Valley Commodore Users' Group
P.O. Box 5494, CA 92517
PET VIC 64 128 Amiga

Rosemead
Rosemead Associate Members
2636 N. Willard Ave., CA 91770
64 128

Sacramento
Sacramento Commodore Users' Group
P.O. Box 13393, CA 95813-13393

Santa Barbara
Santa Barbara Commodore Users' Group
4520 Via Vistosa, CA 93110

San Bernardino
Club 64
P.O. Box 514, Patton, CA 92369-0514
VIC 64 128 Amiga

San Diego
San Diego Commodore Users' Group
P.O. Box 86531, CA 92138-6531

San Jose
64/More Commodore Users' Group
P.O. Box 26811, CA 95159-6811
VIC 64 128 Amiga PC

San Luis Obispo
San Luis Obispo Commodore Club
P.O. Box 3836, CA 93403-3836

San Rafael
Marin Commodore Computer Club
665 Las Colindas Rd., CA 94903
VIC 64 128 Amiga

Santa Maria
Central Coast Commodore Users' Group
4237 Plumeria Ct., CA 93455
VIC 64 128

Santa Rosa
Santa Rosa Commodore Users' Group
333 E. Robles Ave., CA 95407-7971
64 128 Amiga

Stockton
Stockton Commodore Users' Group
1911 Comstock Dr., CA 95209
VIC 64 128

Studio City
Southern California 64 Users' Group
3852 Riverton, CA 91604

Thousand Oaks
Simi Valley Commodore Users' Group
1586 Glenbrock Ln., CA 91320-1805
64 128 Amiga

Ventura
Ventura Commodore Club
6464 Shearwater St., CA 93003
VIC 64 128 Amiga

Westminster
South County Amiga Users' Group
13712 Claremount St., CA 92683
Amiga

COLORADO

Aurora
Colorado PET Users' Group
676 S. Quentin St., CO 80012

Colorado Springs
Commodore Club 4058 Baytown Dr.,
CO 80916
PET VIC 64 128 Amiga PC

Ft. Collins
Ft. Collins C3
1660 Shenandoah Cir., CO 80525

Grand Junction
Western Slope Commodore Users' Group
P.O. Box 4142, CO 81502-4142
64 128

Greeley
NorCoCom
2138 1/2 - 10th St. Rd., CO 80631

Lakewood
Commodore Condor Club
1680 Lewis St., CO 80215

North Glenn
Colorado Commodore Computer Club
11855 Adams St., CO 80233
PET VIC 64 128 Amiga PC

CONNECTICUT

Bristol
Bristol Commodore Users' Group
CompuTech Systems, 178 Pine St.,
CT 06010
64 128

Danbury
Fairfield County Commodore Users' Group
P.O. Box 212, CT 06813
VIC 64 128 Amiga

East Hartford
Hartford County Commodore Users' Group
P.O. Box 8553, CT 06108
VIC 64 128 Amiga

Hebron
Eastern Connecticut Commodore Users' Group
227 Jagger Lane, CT 06248

Meriden
Silver City Commodore Club
70 Webster St., 1st Floor, CT 06450
VIC 64 128

North Haven
Greater New Haven Commodore Users' Group
P.O. Box 796, CT 06473
VIC 64 128 Amiga

Stamford
Stamford Area Commodore Society
P.O. Box 1337, CT 06904

Vernon
Capitol Area Commodore Club
P.O. Box 2372, CT 06066

Waterford
Millstown Users' Group - 64
Sillin Nuclear Training Center,
P.O. Box 128, CT 06385-0128
64 128 Amiga

DELAWARE

Lewes
Lower Delaware Commodore Computer Club
R.D. #2, Box 52-A, DE 19958

DISTRICT of COLUMBIA

Washington
USO Computer Club
207 Beyer Rd., S.W., DC 20032
64 128 Amiga PC

FLORIDA

Beverly Hills
Citrus County Commodore Club
P.O. Box 503, FL 32665
PET VIC 64 128 Amiga PC

Bradenton
Manasota Commodore Users' Group
916 E. 35th Ave. Dr., FL 33508

Dade City
East Pasco Commodore Users' Group
P.O. Box 798, FL 34297-0798
VIC 64 128 Amiga

Daytona Beach
Daytona Beach Amiga Computer Enthusiasts
P.O. Box 10204, Westside Station,
FL 32020
Amiga

Deerfield Beach
Gold Coast Commodore Group
P.O. Box 375, FL 33441
64 128

Englewood
RAM ROM 64
P.O. Box 1369, FL 33533

Ft. Lauderdale
Telecomm Pro Group of Southern Florida
1140 Atkinson Ave., FL 33312

Ft. Walton Beach
Okaloosa Commodore Users' Group
412-A Cobia Avenue, FL 32548

Gainesville
Gainesville Commodore Users' Group
P.O. Box 14716, FL 32604
PET VIC 64 128 Amiga PC

Jacksonville
Commodore Computer Club
8438 Lynda Sue Ln. W., FL 32217
VIC 64 128

Lakeland
Lakeland Police Users' Group
2332 Crystal Park North, FL 33803

Melbourne
El-Shift-Oh
P.O. Box 361348, FL 32936-1348

Merritt Island
Space Coast AMIGA Users' Group
P.O. Box 2098, FL 32952
Amiga

Miami
Miami 2064
11531 SW 84th St., FL 33173-3622

Miami
M.I.C.E.
11110 Bird Rd., FL 33165
VIC 64 128

Miami Springs
Miami Springs Hialeah Users' Group
517 Wren Avenue, FL 33166
PET VIC 64 128

Ocala
Tri-County Commodore Users' Group
P.O. Box 1151, FL 32678

Orlando
Central Florida Commodore Users' Group
P.O. Box 7326, FL 32854

Oviedo
Central Florida Amiga Club
1056 Neely Street, FL 32765
Amiga

Ozona
Suncoast 64s
P.O. Box 6628, FL 34265-6628

Pensacola
Commodore Users of Pensacola
P.O. Box 3533, FL 32516
VIC 64 128

Port Charlotte
Charlotte County Commodore Club
567 N. Ellicott Cir., FL 33952

Ruskin
C.U.S.H.
107 N. Branch Rd., W., FL 33570

Sanibeo
Sanibel Commodore VIC
P.O. Box 1227, FL 33957

Shalimar
Ft. Walton Beach Commodore Users' Group
P.O. Box 3, FL 32549
VIC 64 128 Amiga PC

Titusville
Titusville Commodore Club, Inc.
890 Alford St., FL 32796
VIC 64 128 Amiga

GEORGIA

Albany
Albany Commodore Amateur Computer
P.O. Box 5461, GA 31706-5461

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Athens Commodore Enthusiasts-(ACE)
130 St. James Drive, GA 30606

Atlanta
Amiga Atlanta
Box 7724, GA 30357
Amiga

Augusta
Commodore Club of Augusta
P.O. Box 14337, GA 30919
VIC 64 128 Amiga

Calhoun
R.C. Creations Users' Group
177 Flora Dr., S.W., GA 30701
VIC 64 128

Decatur
Commodore Users' Group of Atlanta
633 Clairmont Cir., GA 30033

Forest Park
Clayton County C-64 Users' Group
6379 Bimini Drive, GA 30050
PET VIC 64 128

Lilburn
Stone Mountain Users' Group
P.O. box 1762, GA 30247
VIC 64 128 Amiga

Savannah
SCUG C/O
103 Virginia Avenue, GA 31404

HAWAII

Ewa Beach
Byte-After-Byte
NAS Barbers Point, 2041C Roosevelt Avenue, HI 96707

Honolulu
Advanced Users' Group
1001-B Signer Blvd., HI 96818
64 128 Amiga

Honolulu
20/64 Hawaii
P.O. Box 23260, HI 97822

IDAHO

Blackfoot
Blackfoot Users' Group
760 Janet Street, ID 83221

Idaho Falls
Eagle Rock Commodore Computer Club
P.O. Box 3884, ID 83401-3884
64 128 Amiga

Jerome
PFP 64 Software Exchange
742 E. 19th, ID 83338
64

Lewiston
Banana Belt Commodore Users' Group
P.O. Box 1272, ID 83501
VIC 64 128 Amiga PC

Paul
Mini-Cassia Computer Club
Route 1, Box 1494, ID 83347
VIC 64 128

Pingree
The Blackfoot Users' Group
417 South 1200 West, ID 83262

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Alton
East Side Computer Club
P.O. Box 1347, IL 62002-1347
VIC 64 128 Amiga

Ashkum
Ashkum Hackers Commodore Users' Group
Box 288, IL 60911
64 128 Amiga

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Bloomington Normal Commodore Users' Group, Inc.
P.O. Box 1058, IL 61702-1058
VIC 64 128 Amiga PC

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Canton Area Commodore Users' Group
13 N. 17th Ave., IL 61520

Darien
Suburban Commodore Users' Group
P.O. Box 2201, IL 60559
64 128 Amiga

East Peria
PAPUG
6 Appletree Lane, IL 61611

Elgin
Fox Valley Commodore Users' Group
833 Prospect, IL 60120
PET VIC 64 128 Amiga

Galesburg
Knox Commodore Club
195 Olive St., IL 61401

Lacon
Heart of Illinois Commodore Users' Group
904 Fifth St., IL 61540

Metropolis
Massac County Commodore Users' Group
15 Hickory Lane, Route 3, IL 62960
VIC 64 128 Amiga

Monmouth
Western Illinois Commodore Users' Group
906 West 6th Ave., IL 61462
PET VIC 64 128 Amiga PC

Murrayville
Jacksonville Area Commodore Users' Group
P.O. Box 135, IL 62668
64 128

North Aurora
Fox Valley 64 Users' Group
P.O. Box 28, IL 60542
64 128

Springfield
Capitol City Commodore Computer Club
P.O. Box 2961, IL 62708

Springfield
SPUG Computer Club
3116 Concord, IL 62704
64 128 Amiga PC

Tuscola
Champaign-Urbana Commodore Users' Group
802 N. Parke St., IL 61953
PET VIC 64 128 Amiga

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Anderson Commodore Users' Group
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Bloomington Commodore Users' Group
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Commodore Computer Club
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VIC 64 128 Amiga PC

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Fort Wayne Area Commodore Club
P.O. Box 13107, IN 46867
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1322 Fairview Drive, IN 46140

Indianapolis
Indy Commodore Computer Club
P.O. Box 11543, IN 46201
VIC 64 128 Amiga PC

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Kokomo Commodore Computer Club
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Commodore Users' Group of Greater La Porte County
P.O. Box 1633, IN 46350
VIC 64 128 Amiga

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Commodore Owners of Lafayette
P.O. Box 5763, IN 47903
64 128

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Logansport Commodore Club
2329 Myers Lane, IN 46947
64 128 Amiga

Pleasant Lake
Steuben's Commodore Users' Group
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VIC 64 128 Amiga

Terre Haute
Western Indiana Commodore Users
P.O. Box 1898, IN 47808

IOWA

Ames
COUGAR Commodore Users' Group
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VIC 64 128

Cedar Rapids
Commfo-Hawk Commodore Users' Group
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PET VIC 64 128 Amiga PC

Davenport
Quad-City Commodore Computer Club
P.O. Box 3994, IA 52808

Denison
Crawford County Commodore Users' Group
519 N. 19th Street, IA 51442

Hartford
Capitol Complex Commodore Computer Club
P.O. Box 58, IA 50118
64 128 Amiga

LeMars
Plymouth County Commodore Users' Group
300 Third Ave. SE, IA 51031

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Syntax Errors Anonymous
1224 - 14th Avenue West,
IA 51301-2941
PET VIC 64 128 Amiga PC

Washington
Washington Area Commodore Users' Group
P.O. Box 445, IA 52353
64 128 Amiga

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P.E.C.C.U.G.
333 Joy Drive, IA 50701
VIC 64 128 Amiga PC

KANSAS

Ft. Leavenworth Commodores Galore
221 Hancock, KS 66027
PET VIC 64 128 Amiga

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High Plains Commodore Users' Group
1307 Western Plains Drive, KS 67601
64 128 Amiga

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Salt City Commodore Club
P.O. Box 2644, KS 67504-2644
64 128 Amiga

Lawrence
Lawrence Commodore Users' Group
P.O. Box 2204, KS 66045
VIC 64 128

Parsons
Parsons Commodore Users' Group
P.O. Box 822, KS 67357
64 128 Amiga PC

Wakarusa
Topeka Commodore Computer Users' Group
7939 S. Topeka Blvd., #39, KS 66546

Wichita
Commodore Users' Group of Wichita, Inc.
P.O. Box 593, KS 67201-0593
PET VIC 64 128 Amiga PC

KENTUCKY

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Glasgow Commodore Users' Group
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Lexington
Commodore Users' Group of Central Kentucky
P.O. Box 55010, KY 40555
PET VIC 64 128 Amiga

Louisville
LUCKY
P.O. Box 19032, KY 40219-0032

Madisonville
Commodore Users' Group of Madisonville
P.O. Box 849, KY 42431
64 128 Amiga

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Baton Rouge C-64 Users' Group
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Southeast Louisiana Commodore Users' Group
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PET VIC 64 128 Amiga PC

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Acadiana Commodore Computer Club
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Lake Charles Users' Group
5631 Lakelyn, LA 70605

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Sixty-Four 'Um
4317 Stockton Street, LA 70001

Metairie
New Orleans Commodore Klub
2308 Houma Blvd., Apt. 724, LA 70001
64 128 Amiga PC

Shreveport
Ark-La-Tex Commodore Computer Club
P.O. Box 6502, LA 71106
64 128 Amiga

Swartz
Northeast Louisiana Commodore Users' Group
P.O. Box 175, LA 71821

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Southern Arostook Commodore Users
P.O. Box 451, ME 04730

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Commodore Users' Group of Penobscot
101 Crosby Hall, U of ME at Orono,
ME 04469
PET VIC 64 128 Amiga PC

Scarborough
Southern Maine Commodore Users' Group
P.O. Box 416, ME 04074-0416

Topsham
Your Commodore Users' Group
103 Main St., ME 04086
VIC 64 128 Amiga PC

MARYLAND

Annapolis
Annapolis Commodore Users' Group
P.O. Box 3358, MD 21403

Baltimore
Another Baltimore Commodore Users' Group
3 Hopkins St., MD 21061

Baltimore
Randallstown Commodore Users' Group
3702 Durley Lane, MD 21207
PET VIC 64 128 Amiga PC

Ft. Meade
C-64/128 Computer Users' Group
SEALANDAIR Recreation Center
9810 Emory Rd., MD 20755
64 128 Amiga

Gaithersburg
Gaithersburg Commodore 64 Users' Group
8705 Waxwing Ter., MD 20879

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Hagerstown Users' Group
23 Coventry Lane, MD 21740
VIC 64 128 Amiga PC

Leonardtown
PAX/COM/64
240 Jefferson St., MD 20650

Lutherville
CUM-BACC
1427 York Rd. at Seminary Ave.,
MD 21093-6014
64 128 Amiga

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Rockville Commodore Users' Group
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VIC 64 128 Amiga

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Vic Appreciators
10260 New Hampshire Ave., MD 20903
VIC

Townson
BAYCUG
12 Wilfred Court, MD 21204

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Commodore Users' Group of Cape Code
P.O. Box 1490, MA 02635
VIC 64 128 Amiga

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M.E.M.O. Computer Club
P.O. Box 3336, MD 2722-3336
VIC 64 128 Amiga

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World Wide Users' Group
P.O. Box 50 C/P, MA 01937

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EM2064 Commodore Users' Group
6 Flagg Rd., MA 01752

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Rockland Commodore Users' Group
98 Myrtle St., MA 02370
PET VIC 64 128 Amiga PC

Westfield
Pioneer Valley Commodore Club
6 Laurel Ter., MA 01085

MICHIGAN

Ann Arbor
Commodore Users' Group of the U of Michigan
School of Public Health, MI 48109
PET VIC 64 128

Bay City
Commodore Connection Club
400 - 18th St., MI 48708

Brooklyn
Columbia Commodore Computer Club
133 Ernest, MI 49230
64 128 Amiga

USER GROUPS

Clio
Northern Genesee Commodore Users' Group
P.O. Box 250, MI 48420

Coloma
Access Unlimited
6777 Bayview Dr., MI 49038
VIC 64 128 Amiga

Dollar Bay
Copper County Computer Users' Group
P.O. Box 196, MI 49922

Dryden
ACO
4401 Pinegrove Dr., MI 48428

East Lansing
Lansing Area Commodore Club
P.O. Box 1065, MI 48823

Gaylord
Northern Michigan Commodore Club
P.O. Box 3066, MI 49735
PET VIC 64 128 Amiga

Holland
Holland Area Commodore Users' Group
1576 Elmer, MI 49423
PET VIC 64 128 Amiga PC

Hudsonville
West Michaigan Commodore Users' Group
3317 Van Buren, MI 49426

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Jackson Commoodre Computer Club
2553 Dan Street, MI 49201
PET VIC 64 128 Amiga PC

Lennon
Commodore Users' Group of Durand
11715 Park Dr., MI 48449

Richmond
COMP
7514 Puttygut Rd., MI 48062
VIC 64 128

Southgate
Down River Commodore Users' Group
P.O. Box 1277, MI 48195
VIC 64 128 Amiga

Traverse City
Traverse Area Commodore Club
200 High Lake Rd., MI 49684
PET VIC 64 128 Amiga

Ypsilanti
Washtenaw Commodore Users' Group
4490 Oakengates Dr., MI 48197
64 128

MINNESOTA

Apple Valley
Apple Valley Commodore Users' Group
15273 Dresden Way, MN 55124
64 128

Fridley
Amiga of Minnestoa Interest Groups Alliance
P.O. Box 32374, MN 55432
Amiga

Mendota
Metro-Area Commodore Computer Club
P.O. Box M, MN 55150

Rochester
Rochester Area Commodore Users' Group
2526 - 6th Ave., N.W., MN 55901
VIC 64 128 Amiga

Willmar
Commodore Users Therapy Group
1309 N. Gorton Ave., MN 56201
VIC 64 128 Amiga

MISSISSIPPI

Biloxi
Coastline Commodore Computer Club
P.O. Box 114, MS 39533
PET VIC 64 128 Amiga PC

Hattiesburg
Hattiesburg Commodore Computer Club
Dept of Polymer Sci, USM
Box 100076 Southern Sta,
MS 39406-0076
64 128 Amiga

Jackson
Jackson Commodore Users' Group
P.O. Box 55734, MS 39216

MISSOURI

Bridgeton
Gateway Amiga Club, Inc.
14850 Phelps, MO 63044
Amiga

Cape Girardeau
Heartland Users' Group
P.O. Box 443, MO 63701
64 128 Amiga PC

Columbia
Mid-Missouri Commodore Club
P.O. Box 7026, MO 65205-7026
64 128

Columbia
Columbia Commodore Users
P.O. Box 7633, MO 65205
VIC 64 128 Amiga PC

Joplin
Joplin Commodore Computer Users' Group
424 S. Florida Ave., MO 64801
PET VIC 64 128 Amiga PC

Lampe
Moark-Commodore Users' Group
H.C. Rt. 1, Box 85, MO 65681
VIC 64 128

Morehouse
Delta Bootheel Users' Group
P.O. Box 16, MO 63868
PET VIC 64 128 Amiga PC

North Kansas City
Commodore North Users' Group
P.O. Box 34534, MO 64116
PET VIC 64 128

St. Louis
Commodore Users' Group of St. Louis
P.O. Box 6653, MO 63125-0653

Warrensburg
Commodore Users' Group of Warrensburg
P.O. Box 893, MO 64093
VIC 64 128 Amiga PC

MONTANA

Great Falls
Cascade County Commodore Users' Group
P.O. Box 739, MT 59403

Red Lodge
Grizzly Hackers
P.O. Box 1179, MT 59068
64 128

Stevensville
Missoula Commodore Users
310 8th St., MT 59870
PET VIC 64 128 Amiga PC

NEBRASKA

Ainsworth
Sandhill Peeks & Pokes
237 N. Park Street, NE 69210
VIC 64 128 Amiga PC

Alliance
Alliance Commodore Computer Club
726 W. 16th St., NE 69301
VIC 64 128

Doniphan
Mid Nebraska Users of Commodore
P.O. Box 39, NE 68832

Fremont
Pathfinder Commodore Users' Group
P.O. Box 683, NE 68025

McCook
McCook Commodore Users' Group
1010 E. 2nd St., NE 69001
VIC 64 128 Amiga

Omaha
Greater Omaha Commodore Users' Group
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VIC 64 128 Amiga PC

Omaha
Amiga Users of the Heartland
P.O. Box 1432 DTS, NE 68101
Amiga

NEVADA

Carson City
Carson City Commodore Users' Network
P.O. Boox 2215, NV 89702

Fallon
C.A.T. F.U.N.
P.O. Box 2155, NV 89406

Las Vegas
Silver State Computer Users' Group
P.O. Box 81075, NV 89180

NEW HAMPSHIRE

Bow
Commodore Users' Group
53 Page Rd., NH 03301

Keene
Monadnock Users' Group For Commodore Owners
135 Liberty Lane, NH 03431-4838
64 128 Amiga

NEW JERSEY

Cherry Hill
Amiga Users' Group of South Jersey
P.O. Box 3761, NJ 08034
Amiga

Holland
Ewing Commodore Users' Group
528 Sugar Tree Rd., PA 18966
64 128

Linwood
C-64 Users' Group of South Jersey
312 Beech Ave., NJ 08221
64 128 Amiga

Matawan
Commodore Users' Group of Central New Jersey
112 Old Bridge Rd., NJ 07747
PET VIC 64 128 Amiga PC

Mount Tabor
Morris Area Users' Group
P.O. Box 492, NJ 07878
PET VIC 64 128 Amiga PC

Roosevelt
Commodore Computer Collection Club
72 Pine Dr., NJ 08555
64 128 Amiga

Sewell
GC64 Commodore Users' Group
P.O. Box 292, NJ 08080

Upper Montclair
Commodore Users' Group of North Jersey
P.O. Box 43024, NJ 07043
PET VIC 64 128 Amiga

Westwood
Commodore 64 Beginners Club
680 Leigh Ter., NJ 07675
64 128

NEW MEXICO

Las Cruces
Aviation & Computer Enthusiasts
1220 Birch Dr., NM 88001
64 128 Amiga PC

Los Alamos
Los Alamos Commodore Users' Group
3974-C Alabama St., NM 87544

Taos
Taos Area Commodore Users' Group
P.O. Box 5089, NM 87571
64 128 Amiga

NEW YORK

Blue Mountain
Adirondack C-64 Users' Group
P.O. Box 99, NY 12812

Bronx
Folklife Terminal Club
P.O. Box 555-MI Co-op City Station, NY 10475
PET VIC 64 128 Amiga PC

Brooklyn
Brooklyn Commodore Users' Group
1735 E. 13th St., Apt. 7-N, NY 11229
VIC 64 128

Corajohard
Mohawk Valley Commodore Users' Group
100 Montgomery St., NY 13317

Franklin Square, LI
Users' Group of Dentists
119 Franklin Ave., NY 11010

Glen Cove
Landing Users' Group
17 Barlow Ave., NY 11542
VIC 64 128

Glendale
Queens Commodore Users' Group
75-11 64th St., NY 11385
64 128

Greene
NYTEC Users' Group
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VIC 64 128

Hammondsport
Finger Lakes Area Komputer Experts
86 W. Lake Rd., NY 14840

Holbrook
CLUB-64
1579 Coates Ave., NY 11741

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Associated Commodore Enthusiasts
37 Silver Ln., NY 11756

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C.O.M.A.
Star Tech Systems
69 Main St., NY 13662

New York
New York Commodore Interest Group
115 Essex St., 146, NY 10002

New York
Technology Not Tricks
619 W. 114th St., NY 10025
PET VIC 64 128

New York
AMUSE
151 - 1st Ave., Suite 182, NY 10003
Amiga

Newark
Finger Lakes Commodore Users' Group
300 West Ave., NY 14513

Oceanside
Commodore Long Island Club
2949 Roxbury Rd., NY 11542
64 128 Amiga PC

Oneonty
Leatherstocking Commodore Users' Group
8 Moffat St., NY 13820
PET VIC 64 128 Amiga

Ossining
For Your Computer Only
35 Belleview Ave., NY 10562
64

Oswego
Oswego Commodore Users' Group
SUNY - 208 Park Hall, Dept. of Technology NY 13126

Rochester
CUGOR
P.O. Box 23463, NY 14692
VIC 64 128 Amiga

Syracuse
Central New York Commodore Users' Group
6887 Peck Rd., NY 13209
VIC 64 128 Amiga PC

Vestal
Triple Cities Commodore Society
1713 Castle Gardens Rd., NY 13850
64 128

Wappingers Falls
Dutchess Commodore Users' Group
18 Cindy Ln., NY 12590
VIC 64 128

Watertown
Syndacate
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PET VIC 64 128 Amiga PC

Westtown
Commodore 64 Users' Group of Orange County
R.D. 1, Box 105, NY 10998-9710
64 128 Amiga

Woodhaven
D-BUG
78-23 91st Ave., NY 11421

NORTH CAROLINA

Greensboro
Triad C-64 Users' Group
3302 Forsyth Dr., NC 27407

Havelock
Down East Commodore Users' Group
P.O. Box 1255, NC 28532

Hickory
Unifour Commodore Users' Group
P.O. Box 9324, NC 28603-9324
VIC 64 128 Amiga PC

Jacksonville
Greater Onslow Commodore Users' Group
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Salisbury
Salisbury Compute
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VIC 64 128 Amiga

Sanford
Sanlee Commodore Club
5822 Bluejay Dr., NC 27330
VIC 64 128 Amiga

OHIO

Ashtabula
Ashtabula County User' Group
1231 Columbus Ave., OH 44004
VIC 64 128

Barberton
Computer Technology Utilization Group
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VIC 64 128 Amiga

Bellbrook
Dayton Area Commodore Users' Group
2160 Waynesville Rd., OH 45305
PET VIC 64 128 Amiga PC

Brookville
C-BUG
12368 Brookville-Pyrmount Rd., OH 45309

Cincinnati
UCOM-64
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Cincinnati
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Amiga

Columbus
Central Ohio Commodore Users' Group
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PET VIC 64 128 Amiga PC

Dayton
Page Manor Users' Group
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VIC 64 128 Amiga

Marion
Marion Ohio Commodore Users' Group
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Mentor
Northwest Ohio Commodore Users' Group
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New Philadelphia
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PET VIC 64 128 Amiga PC

North Canton
Canton/Akron/Massillion Area Users' Group
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64 128 Amiga

North Ridgeville
Basic Bits Commodore Group
5564 Wallace Blvd., OH 44039
VIC 64 128 Amiga

Sandusky
Firelands Amiga Users' Group
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Amiga

Sandusky
Commodore Erie Bay Users' Group
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Springfield
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PET VIC 64 128 Amiga

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64 128 Amiga PC

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Commodore Users' Group of Lawton
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64 128

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Amiga

OREGON

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Coos Computer Club
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Lane County Commodore Users' Group
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Lower Bucks Users' Group
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Greensburg
Westmoreland Computer Users' Club
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Upper Buxmont C-64 Users' Group
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Indiana
Indiana Commodore Users' Group
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Jersey Shore
Central Pennsylvania Users' Group For Commodore
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64 128 Amiga PC

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Capital City Comics
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Lemoyne
Capitol Area Commodore Club
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AK-64 Users' Group
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